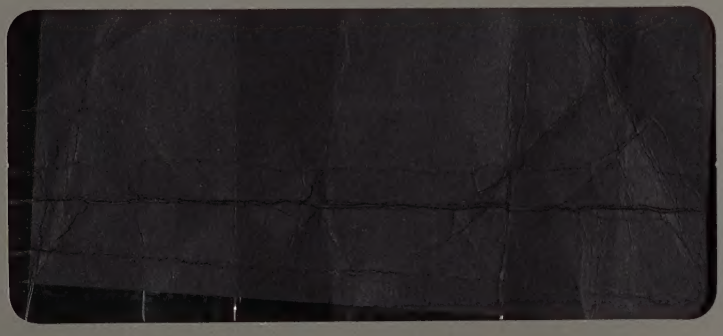

LeCroy

Innovators in Instrumentation

LeCroy 9360 & 9361

Digital Storage Oscilloscope

Service Manual

Version 2.0

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SECTION 1 GENERAL INFORMATION

1.1 Initial Inspection

It is recommended that the shipment be thoroughly inspected immediately upon delivery to the purchaser. All material in the container should be checked against the enclosed Packing List. LeCroy cannot accept responsibility for shortages in comparison with the Packing List unless notified promptly. If the shipment is damaged in any way, please contact the Customer Service Department or local field office immediately.

1.2 Warranty

LeCroy warrants its oscilloscope products to operate within specifications under normal use for a period of three years from date of shipment. Spares, replacement parts and repairs are warranted for 90 days. The instrument's firmware is thoroughly tested and thought to be functional, but is supplied "as is" with no warranty of any kind covering detailed performance. Products not manufactured by LeCroy are covered solely by the warranty of the original equipment manufacturer.
In exercising this warranty, LeCroy will repair or, at its option, replace any product returned to the Customer Service Department or an authorized service facility within the warranty period, provided that the warrantor's examination discloses that the product is defective due to workmanship or materials and that the defect has not been caused by misuse, neglect, accident or abnormal conditions or operation.
LeCroy will return all in-warranty products with transportation prepaid.
This warranty is in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability, fitness, or adequacy for any particular purpose or use. LeCroy shall not be liable for any special, incidental, or consequential damages, whether in contract or otherwise.

1.3 Product Assistance

Answers to questions concerning installation, calibration, and use of LeCroy equipment are available from the Customer Service Department, 700 Chestnut Ridge Road, Chestnut Ridge, New York 10977-6499, U.S.A., tel: (914) 578-6020, and 2 rue du Pré-de-la-Fontaine, 1217 Meyrin 1, Geneva, Switzerland, tel : (41) 22.719.21.11, or your local field engineering office.

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ROTENMUHLGASSE 11
1120 VIENNA
AUSTRIA

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FAX: 43.222.812.2329

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RAMAT HACHAYAL. P.O BOX 13132,
61131 TEL AVIV ISRAEL

TEL: 972.3.6478740
FAX: 972.3.6478771

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LECROY JAPAN CORPORATION
ESAKA SANSHO BLDG - 3RD FLOOR
16-3, 3-CHOME
TARUMICHO, SUITA CITY
OSAKA 564 JAPAN

TEL: 816.330.0961
FAX: 816.330.8096

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ZAIKEN BLDG 6TH FLOOR
19-3, 2-CHOME
SASAZUKA, SHIBUYA-KU
TOKYO 151 JAPAN

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FAX: 813.3376.9587

SCIENTIFIC DEVICES AUSTRALIA
2 JACKS ROAD
SOUTH OAKLEIGH, VICTORIA
AUSTRALIA

TEL: 61.3579.3622
FAX: 61.3579.0971

TATA-HONEYWELL
55-A/8 & 9 HADAPSPAR
INDUSTRIAL ESTATE
PUNE 411 013 INDIA

TEL: 91.212.670445
FAX: 91.212.672205

E.C. GOUGH, LTD
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P.O. BOX 22073
CHRISTCHURCH NEW ZEALAND

TEL: 64.3.3798.740
FAX: 64.3.3796.776

ELECTRO TECH CORPORATION
1ST FLOOR, 16 KAZI CHAMBERS
BAHADURSHAH ZAFAR ROAD
KARACHI-74800 PAKISTAN

TEL: 92.21.493-8087
FAX: 92.21.493-7749

SINGAPORE ELECTRONICS
AND ENGINEERING, LTD
24 ANG MO KIO STREET, 65
SINGAPORE 2056

TEL: 65.480.7783
FAX: 65.481.4272

LECOLN TECHNOLOGY CO.,LTD.
4F-1, NO. 214, SEC.1
HO PING E ROAD
TAIPEI TAIWAN R.O.C.

TEL: 886.2.365.0612
FAX: 886.2.367.1792

SCHMIDT ELECTRONICS LTD
18 F, GREAT EAGLE CENTRE
23 HARBOUR ROAD WANCHAI
HONG KONG

TEL: 852.2507.0222
FAX: 852.2827.5656

P.T. DWI TUNGGAL JAYA SAKTI
WISMA RAJAWALI, 14TH FLOOR
JL JENDRAL SUDIRMAN
34 JAKARTA 10220INDONESIA

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ALLAN CRAWFORD LTD
5835 COOPERS AV, MISSISSAUGA
ONTARIO L4Z 1Y2, CANADA

TEL: 416 890.2010
FAX: 416 890.1959

South America

SEARCH SA
VIAMONTE 1716 - PISO 7
1055 CAPITAL FEDERAL
ARGENTINA

TEL: 54.1.46.6156
FAX: 54.1.394.8374

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TONG LEE BUILDING BLOCK B
SINGAPORE 1334

TEL: 8412818
FAX: 8415988

MEASURETRONIX
2102/31 RAMKAMHANG ROAD
BANGKOK 10240
THAILAND

TEL: 66.2.375.2733-4
FAX: 66.2.374.9965

WOOJOO HI-TECH CORP.
DONGHYUN BLDG.
102-4 MOONJUNG-DONG,
SONGPA-KU SEOUL 138-200 KOREA

TEL: 82.2.449.5472
FAX: 82.2.449.5475

ATP-HI-TEK
ALAMEDA AMAZONAS
422 ALPHAVILLE 06454-030
BARUEI, SP BRAZIL

TEL: 55.11.421.5477
FAX: 55.11.421.5032

Central America

NUCLEOELECTRONICA, SA
CALZ. LAS AGUILAS 101
DELEGATCION ALVARO OBREGON
01710 MEXICO, 20, d.f.
MEXICO

TEL: 52.5593.604
FAX: 52.5593.6021

South Africa

WESTPLEX LTD
TUSCANY HOUSE
376 OAK AVENUE
RANDBURG 2194
REPUBLIC OF SOUTH AFRICA

TEL: 27.11.787.0473
FAX: 27.11.787.0237

1.5 Maintenance Agreements

LeCroy offers a selection of customer support services. Maintenance agreements provide extended warranty and allow the customer to budget maintenance costs after the initial three years warranty has expired. Other services such as installation, training, enhancements and on-site repair are available through specific Supplemental Support Agreements.

1.6 Documentation Discrepancies

LeCroy is committed to providing state-of-the-art instrumentation and is continually refining and improving the performance of its products. While physical modifications can be implemented quite rapidly, the corrected documentation frequently requires more time to produce. Consequently, this manual may not agree in every detail with the accompanying product. There may be small discrepancies in the values of components for the purposes of pulse shape, timing, offset, etc., and, occasionally, minor logic changes. Where any such inconsistencies exist, please be assured that the unit is correct and incorporates the most up-to-date circuitry. In a similar way the firmware may undergo revision when the instrument is serviced. Should this be the case, manual updates will be made available as necessary.

1.7 Service Procedure

Products requiring maintenance should be returned to the Customer Service Department or authorized service facility. LeCroy will repair or replace any product under warranty at no charge. The purchaser is only responsible for one way transportation charges.
For all LeCroy products in need of repair after the warranty period, the customer must provide a Purchase Order Number before repairs can be initiated. The customer will be billed for parts and labor for the repair, as well as for shipping.

1.8 Return Procedure

To determine your nearest authorized service facility, contact the Customer Service Department or your field office. All products returned for repair should be identified by the model and serial numbers and include a description of the defect or failure, name and phone number of the user, and, in the case of products returned to the factory, a Return Authorization Number (RAN). The RAN may be obtained by contacting the customer service department in New York, tel: (914)578-6060, or 6061 ; in Geneva, tel: (41)22/719.21.11, or your nearest sales office.

Return shipment should be made prepaid. LeCroy will not accept C.O.D. or Collect Return Shipments. Air-freight is generally recommended. Wherever possible, the original shipping carton should be used. If a substitute carton is used, it should be rigid and be packed such that the product is surrounded with a minimum of four inches of excelsior or similar shock-absorbing material. In addressing the shipment, it is important that the Return Authorization Number be displayed on the outside of the container to ensure its prompt routing to the proper department within LeCroy.

1.9 Safety Precautions

The following servicing instructions are for use by qualified personnel only. Do not perform any servicing other than contained in service instructions. Refer to procedures prior to performing any service.

Exercise extreme safety when testing high energy power circuits. Always turn the power OFF, disconnect the power cord, discharge the cathode ray tube and all capacitors before disassembling the instrument.

The **W A R N I N G** symbol used in this manual indicates dangers that could result in personal injury.

The **C A U T I O N** symbol used in this manual identify conditions or practices that could damage the instrument.

1.10 Antistatic Precautions

C A U T I O N

Any static charge that builds on your person or clothing may be sufficient to destroy CMOS components, integrated circuits.
In order to avoid possible damage, the usual precautions against static electricity are required.

- Handle the boards in antistatic boxes or containers with foam specially designed to prevent static build-up.

- Ground yourself with a suitable wrist strap.

- Disassembly the instrument at a properly grounded work station equipped with antistatic mat.

- When handling the boards, do not touch the pins.

- Stock the boards in antistatic bags.

SECTION 2 SPECIFICATIONS

9360 & 9361 Digital Oscilloscope

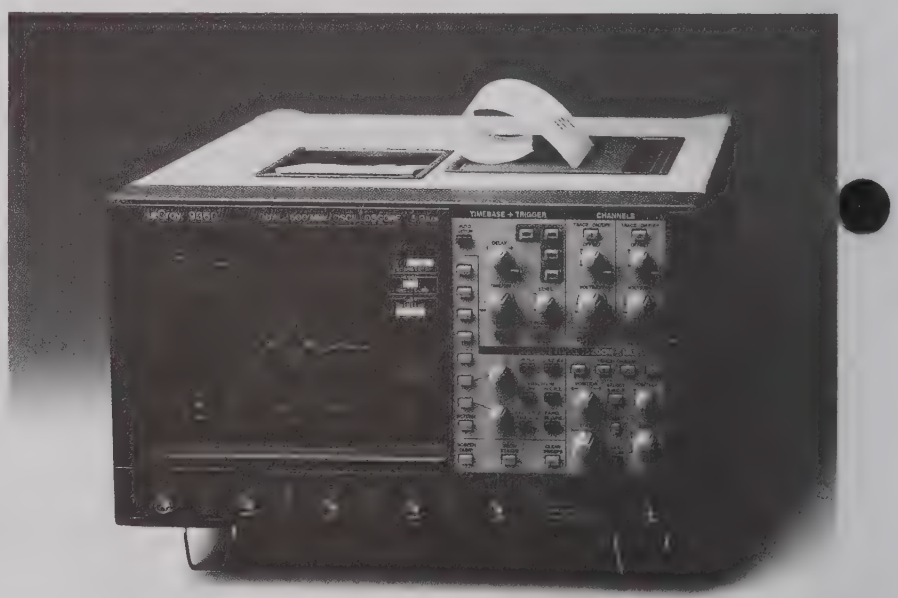
LeCroy

The Digital Scope Specialists

9360 Fast Digitizing Oscilloscope
5 GigaSamples/sec, 600 MHz

Main Features

- 5Gs/s max per channel
- 600 MHz Single-Shot Bandwidth
- Single-Shot acquisition on all timebases
- 8-bit vertical resolution; 11 with ERES option
- Glitch, Interval, Window, Dropout, TV and State-Qualified Triggers
- Advanced signal processing
- Record Length to 25,000 points
- Automatic PASS/FAIL testing
- 32 Automatic Measurements
- Internal 3.5" Floppy Disk Option
- Internal Printer Option



The 9360's 5 GS/s sample rate makes it ideal for applications like digital design, which require high bandwidth Single-Shot acquisition. Its two independent digitizers are clocked simultaneously to make precise timing measurements. Fast Single-Shot pulses can be characterized with 200 ps resolution. All acquisitions are Single-Shot, with no Repetitive Sampling used.

With 300 MHz and 600 MHz inputs, the 9360 is also ideal for high-speed analog work. Optional FET probes ensure low loading and high bandwidth.

SMART Trigger modes like Glitch, Window and Dropout allow you to capture precisely the events of interest. Once signals are triggered, a range of signal processing functions, on live or stored waveforms, allows waveform manipulation without destroying the underlying data.

Menus and text are arranged around the waveform graticules - they never overwrite the waveforms. Each of the main control functions is dedicated to a single knob, to keep the 9360's performance at your fingertips.

The 9360 features the proven user-interface of LeCroy's portable scope family. A bright, high-resolution 9" CRT allows optimum waveform viewing under any conditions.

Optional packages for FFT and extensive Waveform Processing (including Enhanced Resolution processing to 11 bits) are available.

DOS compatible memory card and floppy disk options store waveforms and test setups, and make transferring data to your PC easier than ever before.

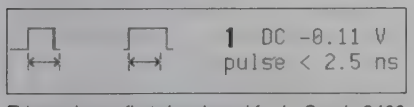
Features and Benefits

HIGH SAMPLE RATE
The 9360's proprietary digitizers operate up to 5 GS/s, the fastest single-shot digitizing available in any oscilloscope. The two independent digitizers guarantee high accuracy channel-to-channel timing measurements.

HIGH BANDWIDTH
For those applications requiring high bandwidth or fast risetime, the 9360's HiBW inputs provide 600 MHz bandwidth at a fixed 100 mV/div. Optional FET probes provide 1 Volt/div or 500 mV/div at the probe tip, ideal for logic work. The NORMAL inputs provide 300 MHz bandwidth at all volts/div settings. With its maximum sample rate of 5 Gs/s, the 9360 is the ideal replacement for general purpose analog oscilloscopes.

SINGLE-SHOT CAPTURE
At fast timebase settings, most DSOs use repetitive sampling techniques to digitize signals. These require many repetitions of the signal to fill each acquisition. If the signal is not stable from one repetition to the next (e.g. due to glitches or drift) or if the signal is intrinsically non-repetitive (rare glitches, random bit streams, modulated carriers, etc.), repetitive techniques result in erroneous data. Because of its high sample rate, the 9360 digitizes waveforms completely in just one shot. So these infrequent or changing events are captured faithfully every time.

EXTENSIVE TRIGGER CAPABILITY
In normal operation, the 9360 triggers just like a conventional oscilloscope. To capture rare or complex conditions, turn on the SMART trigger, and select from 11 different SMART trigger functions. These include GLITCH trigger down to 2.5ns and a unique DROPOUT mode.



Trigger Icons first developed for LeCroy's 9400 series show the trigger setup at a glance.

DROPOUT causes a trigger to occur when the signal disappears for a selectable period of time. BISLOPE WINDOW, INTERVAL and TV triggers are also available, together with TIME and EVENTS qualifiers.

AUTOMATIC MEASUREMENTS
In addition to Cursor measurements, the 9360 performs fully automatic measurements. PASS/FAIL testing allows waveforms to be continually compared with a tolerance mask. (Masks may either be generated inside the instrument, or supplied on DOS-compatible disks or memory cards.)
In addition, the 9360 can calculate any 5 waveform parameters from a list of 32 and compare them with user-defined limits. Any failure will cause pre-programmed actions such as Hardcopy, Save or GPIB SRQ.

DOS-COMPATIBLE MASS STORAGE
The 9360 is available with an optional 3.5" 1.44 MB floppy disk drive which stores traces, setups, screen graphics and Pass/Fail templates. Data are stored to the floppy disk as DOS files, which may be read directly by a PC. LeCroy offers free software for converting these files to other formats.
A high-speed DOS-compatible PCMCIA memory card option is also available.

BUILT-IN PRINTER
As well as driving most printers and plotters via GPIB, RS-232 and (optional) Centronics interface, the 9360 has an optional internal printer. This produces full resolution screendumps, 126 x 90 mm, in under 10 seconds. Stretched screendumps may be made with up to 200 cm/div allowing individual datapoints to be seen.

FLEXIBLE INTERFACING
Both GPIB and RS-232 interfaces may also be used for full remote control of the instrument. All front-panel controls and internal processing functions can be controlled. The 9360's GPIB interface may be used for high-speed waveform transfer where thoughput is critical.

MULTIPLE DISPLAY MODES
The 9360's high-resolution raster display shows from one to four independent waveform grids. Persistence display mode allows easy viewing of signal changes over time, and XY mode plots any two sources against one another. Cursors are usable in all display modes.

MULTIPLE WAVEFORM ZOOM
The 9360 allows simultaneous viewing of a waveform and up to three different expansions. The area to be expanded is selected by moving an intensified portion of the waveform. Cursor measurements may be made from one expanded portion to another, providing for the most accurate time measurements.

EXTENSIVE WAVEFORM MATH
Built-in processing includes mathematics (Add, Subtract, Multiply, Divide, Negation, Identity) and summed averaging up to 1,000 sweeps.

Option WP01 provides summed and continuous averaging up to 1,000,000 sweeps and Mathematics including ABS, Differentiation, Identity, Integration, Log or Exp (base e or base 10), Negation, Reciprocal, Sin(x)/x, Square and Square root. Also included is Enhanced Resolution mode (up to 11 bits) and Extrema mode for storage of peak positive and negative values. More information is available in the 9300 WP01 datasheet.

OPTIONAL FFT PACKAGE
Option WP02 provides comprehensive Spectral Analysis capabilities. These permit the system designer to identify characteristics which may not be apparent in the time domain.

WP02 provides a wide selection of displayed parameters (magnitude, phase, real, imaginary, power spectrum, power density) and windowing functions, as well as averaging in the frequency domain. For more information, see the 9300 WP02 datasheet.

9360 Specifications

ACQUISITION
No. of Channels: 2
No. of Digitizers: 2
Maximum Sample Rate: 5 GS/second simultaneously on each channel

VERTICAL SYSTEM
HiBW (600 MHz) Inputs:
(Timebase Ranges 0.2 us/div to 1 ns/div)
Bandwidth (-3 dB): 600 MHz
Sensitivity: 100 mV/div fixed
Offset Range: ± 400 mV
DC Accuracy: ± 3%
Vertical Resolution: 8 bits
Input Coupling: DC
Input Impedance: 50Ω ± 1%
Maximum Input: 5V RMS (500 mW)
Scale Factors: Probe attenuation is sensed automatically.
Note: The HiBW (600 MHz) inputs may not be used as the Trigger source.

NORMAL (300 MHz) Inputs:
Bandwidth (-3 dB): 300 MHz
Sensitivity: 2 mV/div to 5 V/div, fully variable
Offset Range: 2.0 - 9.9 mV/div: ± 120 mV
10.0 - 199 mV/div: ± 1.2 V
0.2 - 5.0 V/div: ± 24 V
DC Accuracy: ± 3%
Vertical Resolution: 8 bits
Analog Bandwidth Selections: 30 MHz and full
Input Coupling: AC, DC, GND
Input Impedance: 1 MΩ||15 pF or 50Ω ± 1%
Max Input: 1 MΩ:250V (DC+peak AC<10KHz)
50Ω:± 5V DC (500 mW) or 5VRMS
Scale Factors: Probe attenuation is sensed automatically.

WAVEFORM PROCESSING
Up to four processing functions may be performed simultaneously. Available functions are: Add, subtract, multiply, divide, negate, identity and the following:

Average: Summed averaging of up to 1,000 waveforms in the basic instrument. Up to 10^6 averages are possible with Option WP01.
Envelope*: Max, Min, or Max and Min values of from 1 to 10^6 waveforms are displayed.
ERES*: Low-Pass digital filter provides up to 11 bits vertical resolution.
Sample: Sample data is always available, even when trace is turned off. Any of the above modes can be invoked without destroying the sample data.
*Envelope and ERES modes are provided in Optional Math Package WP01.

TIME BASE SYSTEM
Timebases: Main and up to 4 Zoom Traces. Any 4 viewed simultaneously.
Time/Div Range: 1 ns/div to 1000 s/div
Timebase Accuracy: ± 0.07%
Record Length: 500 to 20,000 points (500 points for timebase settings from 500 ns/div to 1 ns/div).
Roll Mode: on ranges 500 ms to 1000 s/div

TRIGGERING SYSTEM
Trigger Modes: Normal, Auto, Single, Stop
Trigger Sources: CH1, CH2, Line, Ext, Ext/10 (Slope, Level and Coupling for each can be set independently.)
Slope: Positive, Negative, Window (BiSlope)
Coupling: AC, DC, LFREJ, HFREJ, HF.
Pre-trigger recording: 0 to 100% of full scale (0 to 75% at 10ns/div) adjustable in 1% steps.
Post-trigger delay: 0 to 10,000 divisions (adjustable in 0.1 div increments)
Holdoff by time: 25 ns to 20s
Holdoff by events: 0 to 10^9 events
Trigger Bandwidth: Up to 500 MHz using HF coupling.
Ext Trigger Input: 1 MΩ||15pF, 250V Max.
Ext Trigger Range: ± 500mV
± 5V with Ext/10
Trigger Timing: Trigger Date and Time are listed in the Waveform Status Menu.

SMART TRIGGER TYPES
Pulse Width: Trigger on pulse width between two limits selectable from 2.5ns to 20s.
Interval Width: Trigger on pulse spacing between two limits selectable from 2.5ns to 20s.
Dropout: Trigger if the input signal drops out for longer than a timeout from 25ns to 20s.
State/Edge Qualified: Trigger on any source only if a given state (or transition) has occurred on one of the other possible sources.
The delay between these events can be defined as a number of events on the trigger channel.
TV: Allows selection of both line (up to 1500) and field number (up to 8) for PAL, SECAM, NTSC or non-standard video.

DISPLAY
Waveform style: Vectors connect the individual sample points, which are highlighted as dots.
CRT: 12.5x17.5 cm (9" diagonal) raster
Resolution: 810x696 points
Modes: Normal, X-Y, Persistence
Real-time Clock: Date, hours, minutes, sec.
Graticules: Internally generated; separate intensity control for grids and waveforms.
Grids: 1, 2 or 4 grids.
Formats: YT, XY, and both together.
Persistence: Normal or Infinite.
Zoom: Up to 200x Horizontal and up to 5x Vertical Expansion (50x with averaging, up to 40 µV sensitivity).

MEASUREMENT SYSTEM
Automatic Measurements determine:

Amplitude	Frequency	Period
Area	Maximum	Peak to Peak
Base	Mean	Risetime
Cycles	Median	RMS
Delay	Minimum	Std dev
Duty Cycle	Overshoot +	Top
Falltime	Overshoot -	Width
Δdelay	Δt at level	

As defined by ANSI/IEEE Std 181-1977 "Standard on Pulse Measurement and Analysis by Objective Techniques".
In addition, Rise and Fall times may be measured at 10% and 90% levels, or 20% and 80% levels, or any other user-specified levels.

Δdelay provides time between midpoint transition of two sources, for making propagation delay measurements.
Δt at level allows the same measurement to be made at any specified level.

Two cross-hair cursors are used to define the region over which these parameters are calculated. The following statistical calculations are also available for each measurement: Average, High, Low, Std. Deviation.

CURSOR MEASUREMENTS
Relative Time: Two cursors provide time measurements with resolution of ±0.05% full-scale for unexpanded traces; up to 10% of the sampling interval for expanded traces. The corresponding frequency value is also displayed.
Relative Voltage: Two horizontal bars measure voltage differences up to ±0.2% of full-scale in single-grid mode.
Absolute Time: A cross-hair marker measures time relative to the trigger, and voltage with respect to ground.
Absolute Voltage: A reference bar measures voltage with respect to ground.

Pass/Fail testing allows up to five of the above listed parameters to be tested against selectable thresholds. Waveform Limit Testing is performed using templates which may be defined inside the instrument.

INTERNAL MEMORY
Waveform Memory: Four 16-bit Reference Memories (M1,M2,M3,M4) for full 25K records.
Processing Memory: Four 16-bit Waveform Processing Memories (A,B,C,D) 25K each.
Setup Memory: Four non-volatile panel memories.

AUTOSETUP
Sets timebase, trigger and sensitivity to display a wide range of repetitive signals. (Amplitude 2mV to 40V; frequency above 50Hz; Duty Cycle > 0.1%). Not available on HiBW inputs.
Autosetup Time: Approximately 2 seconds.
Vertical Find: Automatically sets sensitivity & offset. Not available on HiBW inputs.

INTERFACING
Remote Control of all front-panel controls, as well as all internal functions, is possible by GPIB and RS-232.
RS-232 Port: Asynchronous up to 19200 baud for computer/terminal control or printer/plotter connection.
GPIB Port: (IEEE-488.2) Talker/listener for computer control and fast data transfer.

Hardcopy: Screendumps are activated by a front-panel button or via remote control. TIFF format is available for importing to DTP programs. The following printers and plotters can be used to make hardcopies: HP ThinkJet, QuietJet, LaserJet, PaintJet and EPSON compatible printers. HP 7400 and 7500 series, Philips 8151, Graphtek FP5301 and compatible plotters. An internal printer is also available.

MASS STORAGE OPTIONS
Optional 3.5" Floppy Disk drive and PCMCIA standard memory cards allow storage of traces, screen graphics, setups and Pass/Fail templates. For more detail see LeCroy's "9300 Series 3.5" Floppy, RAM Card, Printer" datasheet.

GENERAL
Temperature: 10° to 35° C (50° to 95° F) rated
0° to 45° C (32° to 113° F) operating
Humidity: <80%
Shock & Vibration: Meets MIL-STD-810C modified to LeCroy design specifications, and MIL-T-28800C
Power: 90-250 V AC, 45-66 Hz, 150 W
Battery Backup: Front-panel settings maintained for two years
Dimensions: (HWD) 8.5"x14.5"x16.25"
210mm x 370mm x 410mm
Weight: 10kg (22lbs) net
15.5kg (34lbs) shipping
Warranty: Two years

Ordering Information

Oscilloscope and Options

9360	5 GS/s Digital Oscilloscope
9360-WP01	Waveform Math
9360-WP02	FFT Processing
9360-MC01	Memory Card Reader
9360-FD01	3.5" Floppy Disk Drive + Centronics Interface
9360-GP01	Internal Printer + Centronics Interface
93XX-GP-R	10 Rolls paper for GP01

Oscilloscope Accessories
Supplied with instrument:

9360-OM	Operator's Manual
9360-RCM	Remote Control Manual
9360-FC	Front Cover
PP002 (2 ea.)	10 MΩ Passive Probe

Ordered Separately:

9360-MC02	128K Memory Card
9360-MC04	512K Memory Card
9360-SM	Service Manual
DC/GPIB-2	2 meter GPIB cable
SG9001	High voltage protector
OC9001	Oscilloscope Cart
PP062	500Ω Passive Probe
P9011	10:1 / 1:1 Probe
P9100	100:1 Oscilloscope Probe
AP020	1 GHz FET Probe (x10)
AP021	800 MHz FET Probe (x5)
93XX-RM01	Rackmount
93XX-TC1	Transit Case
93XX-TC2	Carrying Bag

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

ASIA/PACIFIC	LeCroy Pty Ltd	61.38.90.7358
BENELUX	LeCroy BV	04902.8.9285
CANADA	LeCroy Canada	(514) 928 4707
FRANCE	LeCroy SARL	(1).69.18.83.20
GERMANY	LeCroy GmbH	06221 83.10.01
ITALY	LeCroy SRL	06.336.797.00
JAPAN Osaka	LeCroy Japan	0816.330.0961
JAPAN Tokyo	LeCroy Japan	0813.3376.9400
SWITZERLAND	Geneva	022.719.21.11
SWITZERLAND	Lenzburg	064.51.91.81
United Kingdom	LeCroy Ltd	(0235) 533114

Other sales and service representatives throughout the world.

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Specifications subject to change without notice.

LeCroy
The Digital Scope Specialists

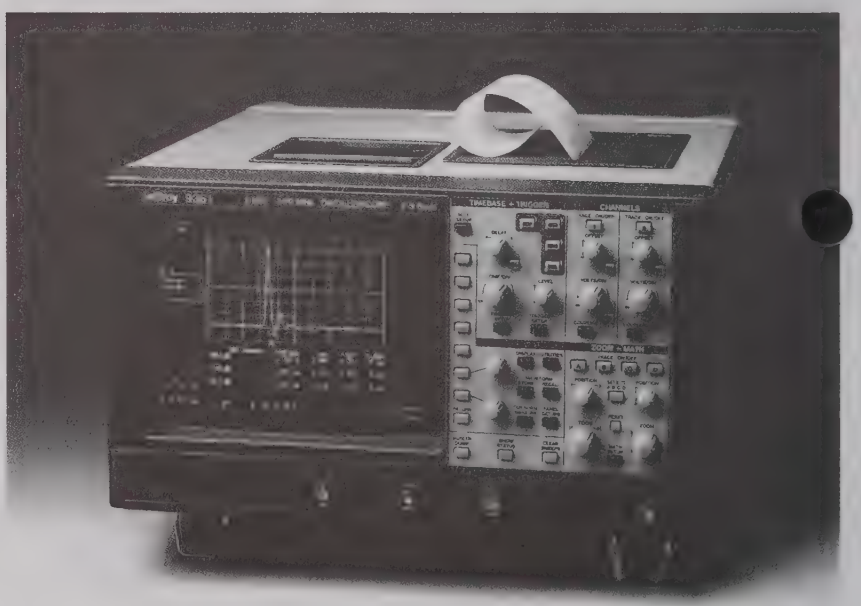
LeCroy

The Digital Scope Specialists

9361 Fast Digitizing Oscilloscope
2.5 GigaSamples/sec, 300 MHz

Main Features

- 2.5Gs/s max per channel
- 300 MHz Single-Shot Bandwidth
- Single-Shot acquisition on all timebases
- 8-bit vertical resolution; 11 with ERES Option
- Glitch, Interval, Window, Dropout, TV and State-Qualified Triggers
- Advanced signal processing
- Record Length to 25,000 points
- Automatic PASS/FAIL testing
- 32 Automatic Measurements
- Internal 3.5" Floppy Disk Option
- Internal Printer Option



The 9361's 2.5 GS/s sample rate makes it ideal for applications like digital design, which require high bandwidth single-shot acquisition. Its two independent digitizers are clocked simultaneously to make precise timing measurements. Fast single-shot pulses can be characterized with 400 ps resolution. All acquisitions are single-shot, with no Repetitive Sampling used.

With 300 MHz bandwidth. the 9361 is also ideal for high-speed analog work. Optional FET probes ensure low loading and high bandwidth.

SMART Trigger modes like Glitch, Window and Dropout allow you to capture precisely the events of interest. Once signals are triggered, a range of signal processing functions, on live or stored waveforms, allows waveform manipulation without destroying the underlying data.

Menus and text are arranged around the waveform graticules - they never overwrite the waveforms. Each of the main control functions is dedicated to a single knob, to keep the 9361's performance at your fingertips.

The 9361 features the proven user-interface of LeCroy's portable scope family. A bright, high-resolution 9" CRT allows optimum waveform viewing under any conditions.

Optional packages for FFT and extensive Waveform Processing (including Enhanced Resolution processing to 11 bits) are available.

DOS compatible memory card and floppy disk options store waveforms and test setups, and make transferring data to your PC easier than ever before.

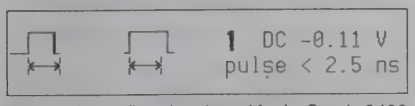
Features and Benefits

HIGH SAMPLE RATE
The 9361's proprietary digitizers operate up to 2.5 GS/s, the fastest single-shot digitizing available in its class. The two independent digitizers guarantee high accuracy channel-to-channel timing measurements.

HIGH BANDWIDTH
For those applications requiring high bandwidth or fast risetime, the 9361's 300 MHz bandwidth equates to a risetime of about 1 nanosecond. Highest probe-tip bandwidth will be achieved by using LeCroy active FET Probes.
With its maximum sample rate of 2.5 Gs/s, the 9361 is the ideal real-time replacement for general purpose analog oscilloscopes.

SINGLE-SHOT CAPTURE
At fast timebase settings, most DSOs use repetitive sampling techniques to digitize signals. These require many repetitions of the signal to fill each acquisition. If the signal is not stable from one repetition to the next (e.g. due to glitches or drift) or if the signal is intrinsically non-repetitive (rare glitches, random bit streams, modulated carriers, etc.), repetitive techniques result in erroneous data. Because of its high sample rate, the 9361 digitizes waveforms completely in just one shot. So these infrequent or changing events are captured faithfully every time.

EXTENSIVE TRIGGER CAPABILITY
In normal operation, the 9361 triggers just like an analog oscilloscope. To capture rare or complex conditions, turn on the SMART trigger, and select from 11 different SMART trigger functions. These include GLITCH trigger down to 2.5ns and a unique DROPOUT mode.



Trigger Icons first developed for LeCroy's 9400 series show the trigger setup at a glance.

DROPOUT causes a trigger to occur when the signal disappears for a selectable period of time. BISLOPE WINDOW, INTERVAL and TV triggers are also available, together with TIME and EVENTS qualifiers.

AUTOMATIC MEASUREMENTS
In addition to Cursor measurements, the 9361 performs fully Automatic Measurements. PASS/FAIL testing allows waveforms to be continually compared with a tolerance mask. (Masks may either be generated inside the instrument, or supplied on DOS-compatible disks or memory cards.)
In addition, the 9361 can calculate any 5 waveform parameters from a list of 32, and compare them with user-defined limits. Any failure will cause pre-programmed actions such as Hardcopy, Save or GPIB SRQ.

DOS-COMPATIBLE MASS STORAGE
The 9361 is available with an optional 3.5" 1.44 MB floppy disk drive which stores traces, setups, screen graphics and Pass/Fail templates. Data are stored to the floppy disk as DOS files, which may be read directly by a PC. LeCroy offers free software for converting these files to other formats.
A high-speed DOS-compatible PCMCIA memory card option is also available.

BUILT-IN PRINTER
As well as driving most printers and plotters via GPIB, RS-232 and (optional) Centronics interface, the 9361 has an optional internal printer. This produces full resolution screendumps, 126 x 90 mm, in under 10 seconds. Stretched screendumps may be made with up to 200 cm/div allowing individual datapoints to be seen.

FLEXIBLE INTERFACING
Both GPIB and RS-232 interfaces may also be used for full remote control of the instrument. All front-panel controls and internal processing functions can be controlled. The 9361's GPIB interface may be used for high-speed waveform transfer where thoughput is critical.

MULTIPLE DISPLAY MODES
The 9361's high-resolution raster display shows from one to four independent waveform grids. Persistence display mode allows easy viewing of signal changes over time, and XY mode plots any two sources against one another. Cursors are usable in all display modes.

MULTIPLE WAVEFORM ZOOM
The 9361 allows simultaneous viewing of a waveform and up to three different expansions. The area to be expanded is selected by moving an intensified portion of the waveform. Cursor measurements may be made from one expansion to another, providing for the most accurate time measurements.

PROBUS™ PROBE INTERFACE
The ProBus system provides a complete measurement solution from probe tip to oscilloscope display. ProBus is an intelligent interconnection between LeCroy oscilloscopes and a growing range of innovative probes. ProBus provides automatic sensing of the probe type, and appropriate control signals.

EXTENSIVE WAVEFORM MATH
Built-in processing includes mathematics (Add, Subtract, Multiply, Divide, Negation, Identity) and summed averaging up to 1,000 sweeps.
Option WP01 provides summed and continuous averaging up to 1,000,000 sweeps and Mathematics including ABS, Differentiation, Identity, Integration, Log or Exp (base e or base 10), Negation, Reciprocal, Sin(x)/x, Square and Square root. Also included is Enhanced Resolution mode (up to 11 bits) and Extrema mode for storage of peak positive and negative values. More information is available in the 9300 WP01 datasheet.

OPTIONAL FFT PACKAGE
Option WP02 provides comprehensive Spectral Analysis capabilities. These permit the system designer to identify characteristics which may not be apparent in the time domain. For more information, see the 9300 WP02 datasheet.

9361 SPECIFICATIONS

ACQUISITION
No. of Channels: 2
No. of Digitizers: 2
Maximum Sample Rate: 2.5 GS/second simultaneously on each channel

VERTICAL SYSTEM
Bandwidth (-3 dB): 300 MHz
Sensitivity: 2 mV/div to 5 V/div, fully variable
Offset Range: 2.0 - 9.9 mV/div: ± 120 mV
10.0 - 199 mV/div: ± 1.2 V
0.2 - 5.0 V/div: ± 24 V
DC Accuracy: ± 3%
Vertical Resolution: 8 bits; all onscreen
Analog Bandwidth Selections: 30 MHz and full
Input Coupling: AC, DC, GND
Input Impedance: 1 MΩ||15 pF or 50Ω ± 1%
Max Input: 1 MΩ:250V (DC+peak AC<10KHz)
50Ω:± 5V DC (500 mW) or 5VRMS
Scale Factors: Probe attenuation is sensed automatically.

WAVEFORM PROCESSING
Up to four processing functions may be performed simultaneously. Available functions are: Add, subtract, multiply, divide, negate, identity and the following:

Average: Summed averaging of up to 1,000 waveforms in the basic instrument. Up to 10^6 averages are possible with Option WP01.
Envelope*: Max, Min, or Max and Min values of from 1 to 10^5 waveforms are displayed.
ERES*: Low-Pass digital filter provides up to 11 bits vertical resolution.
Sample: Sample data is always available, even when trace is turned off. Any of the above modes can be invoked without destroying the sample data.
*Envelope and ERES modes are provided in Optional Math Package WP01.

TIME BASE SYSTEM
Timebases: Main and up to 4 Zoom Traces. Any 4 viewed simultaneously.
Time/Div Range: 1 ns/div to 1000 s/div
Timebase Accuracy: ± 0.07%
Record Length: 500 to 25,000 points (500 points for timebase settings from 500 ns/div to 1 ns/div).
Roll Mode: on ranges 500 ms to 1000 s/div.

TRIGGERING SYSTEM
Trigger Modes: Normal, Auto, Single, Stop
Trigger Sources: CH1, CH2, Line, Ext, Ext/10 (Slope, Level and Coupling set independently.)
Slope: Positive, Negative, Window (BiSlope)
Coupling: AC, DC, LFREJ, HFREJ, HF
Pre-trigger recording: 0 to 100% of full scale (0 to 80% at 10ns/div) adjustable in 1% steps.
Post-trigger delay: 0 to 10,000 divisions (adjustable in 0.1 div increments)
Holdoff by time: 25 ns to 20s
Holdoff by events: 0 to 10^8 events
Trigger Bandwidth: Up to 500 MHz using HF coupling.
Ext Trigger Input: 1 MΩ||15pF, 250V Max.
Ext Trigger Range: ± 500mV
± 5V with Ext/10
Trigger Timing: Trigger Date and Time are listed in the Waveform Status Menu.

SMART TRIGGER TYPES
Pulse Width: Trigger on pulse width between two limits selectable from 2.5ns to 20s.
Interval Width: Trigger on pulse spacing between two limits selectable from 2.5ns to 20s.
Dropout: Trigger if the input signal drops out for longer than a timeout from 25ns to 20s.
State/Edge Qualified: Trigger on any source only if a given state (or transition) has occurred on one of the other possible sources.
The delay between these events can be defined as a number of events on the trigger channel.
TV: Allows selection of both line (up to 1500) and field number (up to 8) for PAL, SECAM, NTSC or non-standard video.

DISPLAY
Waveform style: Vectors connect the individual sample points, which are highlighted as dots.
CRT: 12.5x17.5 cm (9" diagonal) raster
Resolution: 810x696 points
Modes: Normal, X-Y, Infinite Persistence
Real-time Clock: Date, hours, minutes, sec.
Graticules: Internally generated; separate intensity control for grids and waveforms.
Grids: 1, 2 or 4 grids.
Formats: YT, XY, and both together.
Persistence: Normal or Infinite.
Zoom: Up to 200x Horizontal and up to 5x Vertical Expansion (50x with averaging, up to 40 µV sensitivity).

MEASUREMENT SYSTEM
Automatic Measurements determine:

Amplitude	falltime	Peak to Peak
Area	f 80-20%	Period
Base	f@level (abs)	risetime
Cycles	f@level (%)	r 20-80%
Delay	Frequency	r@level (abs)
Δdelay	Maximum	r@level (%)
Δt at level (abs)	Mean	RMS
Δt at level (%)	Median	Std dev
Δt at level (t=0,abs)	Minimum	Top
Δt at level (t=0,%)	Overshoot +	Width
Duty Cycle	Overshoot -	

(As defined by ANSI/IEEE Std 181-1977)

Δdelay provides time between midpoint transition of two sources, for making propagation delay measurements.

Δt at level allows the same measurement to be made at any specified level.

Two cross-hair cursors are used to define the region over which these parameters are calculated. The following statistical calculations are also available for each measurement: Average, High, Low, Std Deviation.

Pass/Fail testing allows up to five of the above listed parameters to be tested against selectable thresholds. Waveform Limit Testing is performed using templates which may be defined inside the instrument.

CURSOR MEASUREMENTS
Relative Time: Two cursors provide time measurements with resolution of ±0.05% full-scale for unexpanded traces; up to 10% of the sampling interval for expanded traces. The corresponding frequency is also displayed.
Relative Voltage: Two horizontal bars measure voltage differences up to ±0.2% of full-scale in single-grid mode.
Absolute Time: A cross-hair marker measures time relative to the trigger, and voltage with respect to ground.
Absolute Voltage: A reference bar measures voltage with respect to ground.

INTERNAL MEMORY
Waveform Memory: Four 16-bit Reference Memories (M1,M2,M3,M4) for full 25K records.
Processing Memory: Four 16-bit Waveform Processing Memories (A,B,C,D) 25K each.
Setup Memory: Four non-volatile panel memories.

AUTOSETUP
Sets timebase, trigger and sensitivity to display a wide range of repetitive signals. (Amplitude 2mV to 40V; frequency above 50Hz; Duty Cycle > 0.1%).
Autosetup Time: Approximately 2 seconds.
Vertical Find: Automatically sets sensitivity & offset.

INTERFACING
Remote Control of all front-panel controls, as well as all internal functions, is possible by GPIB and RS-232.
RS-232 Port: Asynchronous up to 19200 baud for computer/terminal control or printer/plotter connection.
GPIB Port: (IEEE-488.2) Configured as talker/listener for computer control and fast data transfer.

Hardcopy: Screen dumps are activated by a front-panel button or via remote control. TIFF format is available for importing to DTP programs. The following printers and plotters can be used to make hardcopies: HP ThinkJet, QuietJet, LaserJet, PaintJet and EPSON compatible printers. HP 7400 and 7500 series, or HPGL compatible plotters. An internal printer is also available.

MASS STORAGE OPTIONS
Optional 3.5" Floppy Disk drive and PCMCIA standard memory cards allow storage of traces, screen graphics, setups and Pass/Fail templates. For more detail see LeCroy's "9300 Series 3.5" Floppy, RAM Card, Printer" datasheet.

GENERAL
Temperature: 10° to 35° C (50° to 95° F) rated 0° to 45° C (32° to 113° F) operating
Humidity: <80%
Shock & Vibration: Meets MIL-STD-810C modified to LeCroy design specifications, and MIL-T-28800C
Power: 90-250 V AC, 45-66 Hz, 150 W
Battery Backup: Front-panel settings maintained for two years
Dimensions: (HWD) 8.5"x14.5"x16.25" 210mm x 370mm x 410mm
Weight: 10kg (22lbs) net 15.5kg (34lbs) shipping
Warranty: Two years

Ordering Information

Oscilloscope and Options

9361	2.5 GS/s Digital Oscilloscope
9361-WP01	Waveform Math
9361-WP02	FFT Processing
9361-MC01	Memory Card Reader
9361-FD01	3.5" Floppy Disk Drive + Centronics Interface
9361-GP01	Internal Printer + Centronics Interface
93XX-GP-R	10 Rolls paper for GP01

Oscilloscope Accessories
Supplied with instrument:

9361-OM	Operator's Manual
9361-SM	Service Manual
9361-FC	Front Cover
PP002 (2 ea.)	10 MΩ Passive Probe

Ordered Separately:

9361-MC02	128K Memory Card
9361-MC04	512K Memory Card
DC/GPIB-2	2 meter GPIB cable
SG9001	High voltage protector
OC9001	Oscilloscope Cart
PP062	500Ω Passive Probe
P9011	10:1 / 1:1 Probe
P9100	100:1 Oscilloscope Probe
AP020	1 GHz FET Probe (x10)
AP021	800 MHz FET Probe (x5)
93XX-RM01	Rackmount
93XX-TC1	Transit Case
93XX-TC2	Carrying Bag

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

ASIA/PACIFIC	LeCroy Pty Ltd	61.38.90.7358
BENELUX	LeCroy BV	04902.8.9285
FRANCE	LeCroy SARL	(1).69.18.83.20
GERMANY	LeCroy GmbH	06221 83.10.01
ITALY	LeCroy SRL	06.336.797.00
JAPAN Osaka	LeCroy Japan	0816.330.0961
JAPAN Tokyo	LeCroy Japan	0813.3376.9400
SWITZERLAND	Geneva	022.719.21.11
SWITZERLAND	Lenzburg	064.51.91.81
United Kingdom	LeCroy Ltd	(0235) 533114

Other sales and service representatives throughout the world.

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LeCroy
The Digital Scope Specialists

LeCroy
The Digital Scope Specialists

9300 Series PCMCIA Hard Disk Adapter, Internal Printer, 3.5" Floppy Disk Drive and Ram Card

Main Features

- PCMCIA Type III compatible Hard DIsk Adapter, DOS Compatible
- High-resolution Printer, ideal for fast, on-the-spot documentation
- 3.5" Floppy disk drive, DOS format - affordable and convenient
- Ultra-fast RAM card, DOS format, ideal for PASS/FAIL testing
- Convenient Hardcopy storage to card/disk

3.5" Floppy

The floppy drive is a convenient storage medium, not only for saving and retrieving waveforms or instrument settings, but also for storing hardcopies that can be printed from a PC when desired. The floppy supports both 720k and 1.44M DOS formats so that it can be read back on any PC with a 3.5" drive, avoiding the need to interface the oscilloscope to your PC. As with the RAM-card option, the floppy system capabilities include automatic storage of data under pre-programmed conditions.

PCMCIA Storage

PCMCIA Interfaces for RAM card and Hard Disk allow the use of fast, removable and compact storage media for saving and retrieving waveforms and instrument settings. They comply fully with the PC industry's PCMCIA and JEIDA standards. With the special Autostore feature, waveforms can be automatically stored after every acquisition and "played back" when desired. When used in combination with the PASS/FAIL feature, failure data can be saved automatically for later analysis.

Printer

The internal printer is an invaluable tool for instant, on-the-spot documentation. It generates a clear, crisp hardcopy of the screen in just a few seconds. The large size of the printout, combined with its high resolution, provide you with an excellent document that matches the screen's superior quality to its finest details. And because it frees you from the trouble of carrying and interfacing a bulky printer, it is the ideal solution for field measurements.

Mass Storage Features and Benefits

LeCroy's mass storage capabilities provide a range of benefits:
- Easy data transfers to PCs
- Waveform logging
- Waveform archiving for future use
- Faster troubleshooting
- Faster, more reproducible testing
- Shared oscilloscope resources

EASY DATA TRANSFER TO PC
Because the 9300 series oscilloscope uses DOS-formatted floppy disks, hard disks and memory cards, transferring waveform data to a PC is simple. The removable storage allows transfers without cables, programming, or any knowledge of GPIB, RS-232, or other interfaces.
In addition, LeCroy provides free of charge, a binary-to-ASCII format conversion program for the PC, accommodating those PC-based analysis packages (such as spreadsheets) that require ASCII format.

WAVEFORM LOGGING
By using Glitch or Dropout triggering in combination with the powerful AUTOSTORE mode, LeCroy oscilloscopes can monitor and log intermittent problems automatically. To store a waveform, the oscilloscope opens and names a DOS-compatible file and then stores the waveform data in the file. This logging feature requires no operator intervention and maintains data and the operational setup through power line failures. Logged waveforms can be selectively played back by trigger time/date or by sequence number, or can be scrolled through sequentially.

WAVEFORM ARCHIVING FOR FUTURE USE
- Recallable proof of performance
- Additional data analysis as needed
- Accurate trend or drift monitoring
- Calibration procedure verification

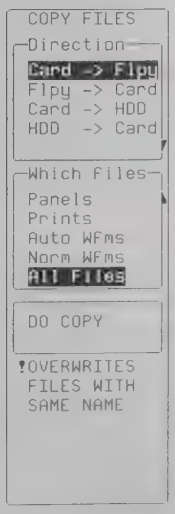
When storing waveforms, LeCroy DSOs also archive a header of setup information and the acquisition time/date. After recalling an archived waveform, the several hundred byte header ensures correct time and voltage scaling. When recalled into the oscilloscope, the waveform can be zoom expanded, compared, or analyzed just like a live waveform. The time/date offers proof of measurement authenticity and trend sequence.
All LeCroy DSOs store raw waveform data using one byte per sample point. Signal averaged, Enhanced Resolution (ERES) filtered, and other processed data use two bytes per point, to take advantage of the added resolution.

HARDCOPY ARCHIVING
Hardcopies of the screen can also be stored for future use. For instance, a screen saved in TIFF format can be imported into a Word Processor to illustrate a report. Additionally, field-measurement screens can be saved in LaserJet format on the memory card or floppy disk, and then printed from a PC back in the lab.

FASTER FIELD MEASUREMENTS
Recallable reference waveforms and oscilloscope setups for each test point on a Device Under Test (DUT) can make fault troubleshooting faster and more accurate. A dedicated memory card or floppy disk will hold all of the correct test point waveforms and associated DSO setups for a particular DUT.
The technician can recall stored setups quickly and consistently, thereby avoiding incorrect measurement conditions. He can then compare actual waveforms to recalled reference waveforms taken from a known working system. He will therefore spend less time probing a large number of test points and verifying that the correct waveforms exist.
If a problem is found, the aberrant waveform may be saved. It can later be shown to laboratory-based engineers, for example, for problem-solving guidance or for improvement of DUT design.
Memory cards - rugged and pocket-sized - are ideal for this application.

FASTER, MORE REPRODUCIBLE TESTING
LeCroy oscilloscopes will compare measured waveforms against upper and lower waveshape tolerances or against parameter limits, such as risetime, overshoot, or peak voltage, and make PASS/FAIL decisions. This PASS/FAIL testing decreases test times in GPIB-based ATE systems by reducing data transfers. It increases reproducibility and accuracy in manual tests by eliminating human errors.
Once defined, these tests may be saved by storing instrument setups which include the specified tolerances and/or reference waveforms. Different test personnel can easily share a common test library via a PC network.
Waveshape test limits can be generated by capturing a "golden" waveform and by then selecting amplitude and timing limits (in fractions of screen graticule divisions). Or a user can create standard waveform limit templates on a computer (e.g. ANSI/CCITT telecommunication templates).
With the LeCroy 9300 series DSOs, specific parameter tolerance test procedures are created by selecting limits for any five out of twenty pulse parameters with Boolean AND / OR conditions between them. During testing, FAIL responses can include an audible beep, GPIB SRQ, hardcopy output, or store to memory card.

SHARED OSCILLOSCOPE RESOURCES
By plugging-in your *personal* floppy disk, RAM card or PCMCIA Hard Disk you can restore your setup in seconds. Individual users can keep preferred setups on separate disks or cards or within separate directories.



A selection of files can be copied between the available mass storage devices.

Hardcopy Features and Benefits

The internal printer adds a whole range of benefits to the LeCroy 9300 series:
- Ultra-fast printouts
- High resolution printing
- Easy transportation
- Trouble-free interfacing
- Auto Print on Trigger

ULTRA-FAST PRINTOUTS
Measurement documentation is made easier and faster since the internal printer produces a hardcopy in less than 10 seconds. In addition the document is date- and time-stamped: a real bonus for archiving test results.

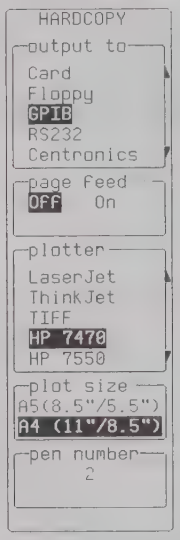
HIGH RESOLUTION PRINTING
With a resolution of 190 dots-per-inch, the internal printer matches the screen's superior quality. And for even higher resolution, the printout can be stretched to a full 70 meter length so you can see those traces down to their finest details.

EASY TRANSPORTATION
A printer that is totally integrated in the instrument makes life much easier for field-measurement applications. Imagine carrying a scope, a printer (and perhaps a floppy drive) in one hand!

TROUBLE-FREE INTERFACING
The internal printer frees your mind from the struggle with cable schematics, baud rates, gender-changers and dip switches, for more productive tasks. Select the internal printer in the scope's utilities menu, hit the SCREEN DUMP button, and you're in business!

AUTO PRINT ON TRIGGER
The Auto Print feature is used to print a screen image on each acquisition.

The 9300 series oscilloscope supports a whole range of popular printers and plotters. Hardcopies can be either sent directly to the peripheral device or to the floppy disk, Ram Card or Hard disk for future use.



OTHER HARDCOPY SOLUTIONS
High quality project reports, presentation materials, technical manuals, and troubleshooting instructions often require integration of text and graphics on the same page.
Advanced PC desktop publishing and word processors such as Word-for-Windows, WordPerfect, or AMI Pro can directly import graphic files, size them, and position them anywhere on the page. Written text can then wrap around or be positioned within the graphics.

LeCroy 9300 oscilloscopes will save screens in TIFF (Tagged Image Format File), or BMP. After transferring the file to a PC, the DTP software can import and manipulate the document like any other graphic object.

The LeCroy 9300 series also offers a wide range of interfacing capabilities with external hardcopy devices:

- Plotters. HPGL, HP 7400 and 7500 compatible
- Printers. HP LaserJet, ThinkJet, Paintjet (including color), DeskJet (including color) and Epson
- Interfacing. RS-232, GPIB, or even Centronics (optional)

Specifications

MASS STORAGE

	Floppy Disk	Ram Card	Hard Disk
Compatibility	3.5" Floppy Drive	PCMCIA I, II JEIDA 3.0, 4.0	PCMCIA III
Supported Formats	DOS Format	Read/Write: SRAM Read: OTP, ROM, Flash DOS Format	DOS Format
Size	720k byte, 1.44M byte	Up to 8M byte	Up to 512M byte * Note 1
Max Transfer Rate	18k byte/sec	500k byte/sec	150k byte/sec
Typical waveform Transfer Speed (Store/Recall) **1000 point** **10000 point** **100000 point** **1M point**	 1.1s / 0.4s 1.8s / 1.0s 7.5s / 6.5s 57s / 55s	 40ms / 30ms 70ms / 60ms 300ms / 300ms 2s / 2s	 140ms / 120ms 240ms / 220ms 1.0s / 0.9s 7.0s / 6.5s

Waveform File size: A channel-trace will use 1 byte per sample plus approximately 360 bytes of waveform descriptor. A processed trace will use 2 bytes per sample.
Template Size: Approximately 21k bytes.
Panel Setup Size: Approximately 3k bytes.

*Note 1: When available

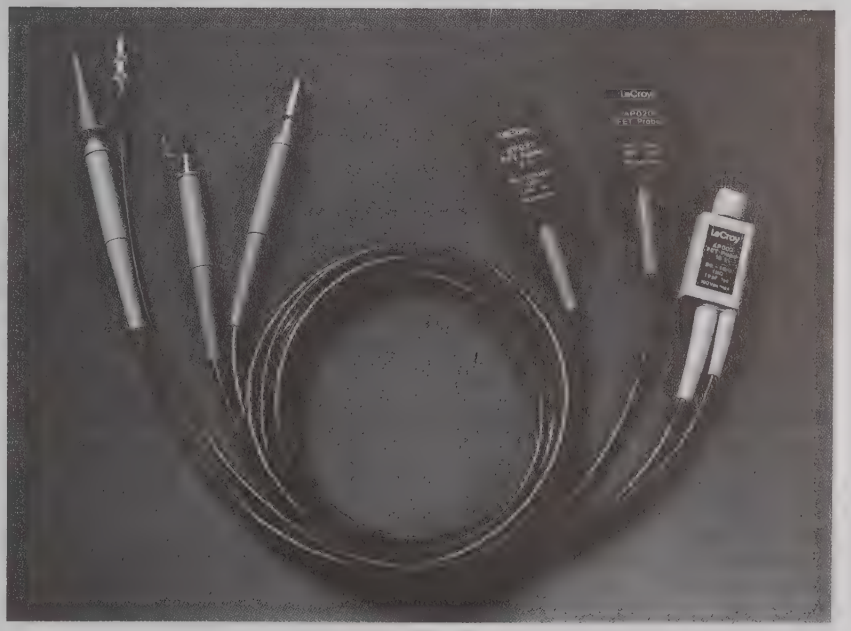
PRINTER
Type: Raster printer, thermal.
Resolution: 190 DPI.
Printout Size: 126 mm x 90 mm
Paper: Thermal printer paper, 30 meter roll, 110 mm width, type Seiko or similar.
Printing speed: 6 seconds approx. for one screen.

LeCroy
The Digital Scope Specialists

AP003, AP020 and AP021 Active FET Probes

Main Features

- Bandwidths to 1 GHz
- LeCroy ProBus™ interface for the AP020 and the AP021
- 1 MΩ input Impedance
- Low capacitance at probe tip
- Rugged mechanical construction
- Automatic sensing and control on scopes equipped with ProBus™



FET Probes provide the oscilloscope user with a higher level of measurement capability. Compared with passive probes, they offer low circuit loading, low capacitance and high bandwidth. This combination makes them the ideal tools for working on sensititve or high-speed electronics.

This performance is achieved by the integration of a high-impedance Field Effect Transistor (FET) amplifier into the probe tip. The circuit under test sees only the amplifier's input impedance - it is effectively buffered from the scope's input impedance and the probe cable.

LeCroy's AP series of FET probes are mechanically rugged in design, while their miniature construction allows them to be used in hand-held PCB probing applications. Their detachable tips are designed for simple replacement, and they are supplied with a full set of accessories.

Models AP020 and AP021 offer 1 GHz and 800 MHz Bandwidth respectively. AP020 features X10 signal attenuation and is especially recommended for LeCroy's 9320 and 9324 1 GHz oscilloscopes. The AP021 offers X5 attenuation when used with the new 9360.

As an active device, the FET probe requires a stabilized power supply. LeCroy provides an elegant solution to this with the ProBus™ probe interface.

ProBus™ provides probe power and signal connection in one integrated package. It also allows the scope to control other probe functions, such as input coupling and DC offset. The ProBus™ interface is now available on a growing range of LeCroy oscilloscopes and probes. AP003 has an external power connector for use with scopes which are not ProBus™ compatible. All other models use the ProBus™ interface.

Features and Benefits

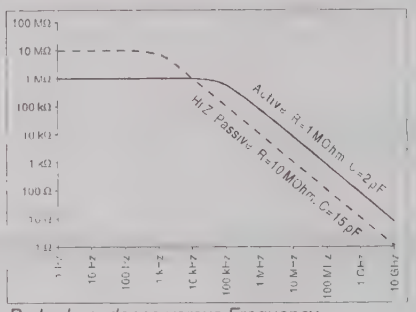
Connecting a probe to a circuit can significantly distort its signals by adding undesired loading - mostly capacitive and resistive. FET probes offer high resistance and low capacitance therefore they present minimal loading to the circuit under test, and protect from making erroneous measurements.

HIGH RESISTANCE

Low resistance probes have significant DC effects when used in high impedance circuits. They can greatly affect the behaviour of the device under test by changing the swing and the DC offset of the probed signal. A 1 MΩ impedance FET probe will not affect gain or offset in virtually all the cases.

LOW CAPACITANCE

Although not important in DC measurements, capacitive loading is very disruptive at high signal frequencies. The capacitive loading effects can be drastic. When probed with a 10 MΩ, 15 pF passive probe, a 100 MHz signal "sees" a 100 Ω load as illustrated on the picture below.



Probe Impedance versus Frequency

With only 2 pF of capacitance at the probe tip, LeCroy's FET probes reduce circuit loading at high frequencies by a factor of 10. Minimizing tip capacitance can also push the probe's resonant frequency beyond the system bandwidth. Sensitivity to ground lead inductance is also minimized.

PROBUS

The ProBus™ system is a complete measurement solution from probe tip to oscilloscope display. It supplies power to active probes, while automatically sensing probe attenuation. ProBus™ enables direct control of the probe offset and input coupling from the scope's front panel, extending the instrument's accuracy up to the probe tip. In addition, ProBus™ automatically optimizes scope and probe offset adjustments, calibrates the gain at the probe tip and compensates for non-linearities, providing most accurate measurements.

Specifications

MODEL	AP003	AP020	AP021	MODEL	AP003	AP020	AP021
Bandwidth (MHz)	DC-1000	DC-1000	DC-800	**Dynamic Range**	±7 V	±5 V	±2.5 V
Risetime (psec)	< 350	< 350	< 437	**DC Offset Range**	N/A	±20 V	±10 V
Attenuation	10:1 ±2%	10:1±2%	5:1±2%	**Input Coupling**	DC	DC/AC	DC/AC
Input R (MΩ)	1 ±5%	1±2%	1±2%	**Total length (m)**	1.5	1.5	1.5
Input C (pF)	1.9 ±0.3	1.8 ±0.2	2.7 ±0.2	**Power requirement**	±12 V	±12 V	±12 V
Max Input Voltage	±100 V	±40 V	±20 V	**Interface**	N/A	ProBus™	ProBus™

Recommended Matching

LeCroy Model	AP-003	AP-020	AP-021
9304-10-14	XX		
9360-61			X
9320-24		X	
94XX	X		
7200	XX		
7200A	X		
ScopeStation	X		

X: External Power Supply not required
XX: External Power Supply required

Ordering Information

AP003	1 GHz active FET probe
AP020	1 GHz active FET probe
AP021	800 MHz active FET probe with ProBus™ interface. All probes are shipped with the following accessories: 1x Retractable hook 1x Ground Lead 1x BNC Adaptor 1x IC Tip 3x Ground Bayonets 1x Mini pincher with Lead Adaptor
AP501	Power Supply for the AP003

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

ASIA/PACIFIC	LeCroy Pty Ltd	61.38.90.7358
BENELUX	LeCroy BV	04902.8.9285
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Specifications subject to change without notice

LeCroy
The Digital Scope Specialists

AP030, SI 9000 and SI 9000A Active Differential Probes

Main Features

- Bandwidths to 15 MHz
- Multiple:
  - Attenuations
  - Differential Voltage Ranges
  - Common Mode Voltages
- High Input Impedance
- Rugged and Lightweight Mechanical Construction

The Models AP030, SI 9000 and SI 9000A are fully differential active probes designed for applications where electric signals must be measured relative to a floating voltage, other than ground potential.

These probes are designed specifically for situations where:

- the reference voltage may be several hundreds volts above or below ground;
- measurements require the rejection of common-mode signals, (e.g. to evaluate small amplitude pulses riding on big common-mode signals);
- ground loops and currents produce so much interference that small signals cannot be detected.

With these differential probes the oscilloscope user avoids both the dangerous practice of floating the scope, and the technique of using two scope channels in "Invert and Add" mode, which is limited both in common mode rejection and in dynamic range.

Models AP030, SI 9000 and SI 9000A are lightweight and easy to use. They have the rugged mechanical construction required for laboratory, manufacturing and field service environments, and are battery powered for greater safety and convenience.

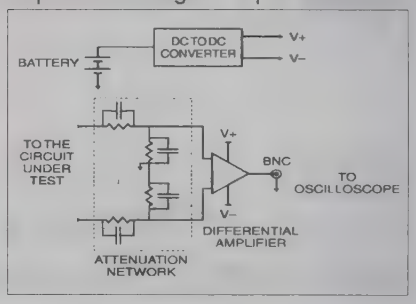
Features and Benefits

FULLY DIFFERENTIAL INPUTS
The probes are fully differential active devices. The differential technique allows measurements to be made between two points in a circuit without reference to ground. The two input signals are processed inside the probe (as illustrated in figure) and the resulting single-ended signal may be measured by any grounded oscilloscope.

HIGH COMMON MODE VOLTAGE
The three probes offer a range of Common Mode Voltages from 40 V to 1000 V.

RUGGED CONSTRUCTION
The probes are designed to be compact and lightweight with power provided by four AA size 1.5 V batteries. A rubber casing enhances the probes' resistance to shocks.

SAFETY
Use of differential probes is safe within the specified voltages. Their use avoids less reliable alternatives, or possible dangerous practices.



Specifications

MODEL	AP030	SI 9000	SI 9000A
Bandwidth (MHz)	15 MHz	15 MHz	15 MHz
Risetime	24 ns	24 ns	24 ns
Attenuation	1:10/1:100	1:20/1:200	1:50/1:500
Atten. Accuracy	2%	2%	2%
Input Resistance	2 MΩ	2 MΩ	2 MΩ
Input Capacitance	12 pF each side to ground		
Input Configuration	Differential		
Input Voltage			
Differential Max	±400 VDC or 280 Vrms for 1:100 ±40 VDC or 28 Vrms for 1:10	±700 VDC or 500 Vms for 1:200 ±70 VDC or 50 Vms for 1:20	±1000 VDC or 700 Vrms for 1:500 100 VDC or 70 Vrms for 1:50
Common Mode Max	±420 VDC or 300 Vrms	±700 VDC or 500 Vrms	±1000 VDC or 700 Vrms
Absolute Max	±1000 VDC or 700 Vrms		
CMRR			
50Hz	-90db	-80db	-80db
1KHz	-80db	-70db	-70db
1MHz	-53 db	-45db	-45db
Output Voltage			
Amplitude Max	±4 V	±3.5 V	±2 V
Offset	<± 5 mV	<±10 mV	<±10 mV
	typical -10º C to +40º C		
Noise	1.5 to 2mV typical		
Source Impedance	1Ω at 1 KHz, 8Ω at 1 MHz typical		
Ambient Temperature			
Operating	-10º C to +40º C		
Storage	-30º C to +70º C		
Power requirement	Four internal 1.5 V AA size batteries or external AC to 6 Vdc adaptor Typical consumption 50 mA		
Dimensions	6.6" (168mm) x 2.4" (62mm) x 0.79" (20mm) excluding casing		
Weight	9.35 oz (265 gr) excluding batteries and casing		

Ordering Information

AP030	15 MHz differential probe 1:10 / 1:100
SI 9000	15 MHz differential probe 1:20 / 1:200
SI 9000A	15 MHz 1:50 / 1:500

All models are delivered with rubber casing.
Batteries not included

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

ASIA/PACIFIC	LeCroy Pty Ltd	61.38.90.7358
BENELUX	LeCroy BV	04902.8.9285
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United Kingdom	LeCroy Ltd	(01235) 533114

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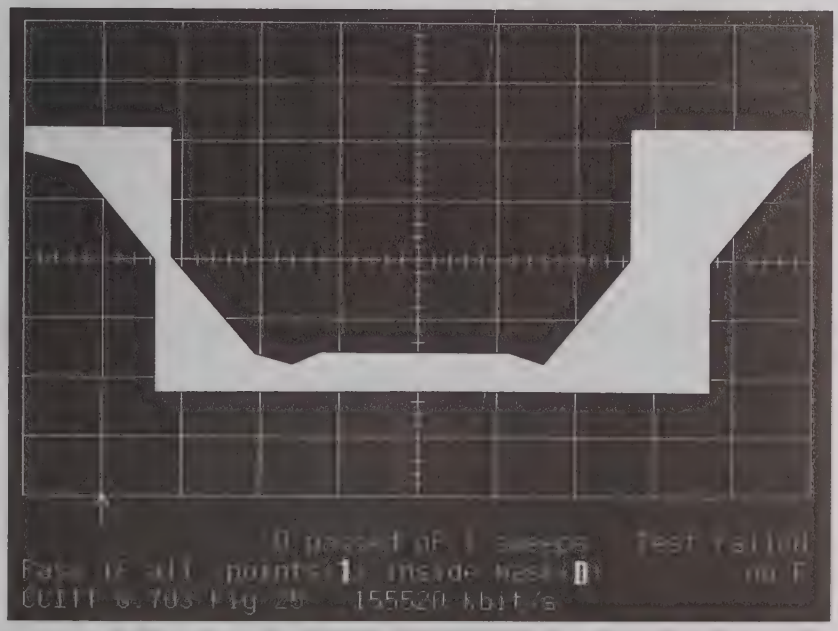
Specifications subject to change without notice.

LeCroy
The Digital Scope Specialists

TC1 - CCITT, ANSI and ISDN Telecommunications Test Masks

Main Features

- 25 standard telecom signal masks including SDH and SONET
- Available on 3.5" DOS floppy or PCMCIA memory card
- Up to 4 different pulses can be tested simultaneously
- Allows combination of mask and pulse-parameter testing
- Actions such as Storage, Hardcopy, Beeping, or TTL pulse can be carried out when signal fails



Now you can make telecom pulse-shape measurements to CCITT, ANSI and ISDN standards without using Mylar overlays. LeCroy TC1 automates the mask measurements that are so time-consuming with analog oscilloscopes. In addition the computed Pass/Fail test brings accuracy and repeatability to what used to be simple eyeballing. Human errors can therefore be significantly minimized. And when the test fails, actions such as a TTL pulse output can drive another test device, eliminating the need for developing costly software for production test. The test masks are available on a PCMCIA memory card or a 3.5" DOS floppy disk. That means they can be used on any LeCroy 9300 or 9400 oscilloscope carrying either option, eliminating the need for costly factory retrofits. Just plug in the card or floppy and turn your LeCroy oscilloscope into a Telecom Physical-Layer Tester.

The PP 090 75 Ω interface ensures correct impedance matching and voltage readings on the oscilloscope.

Features and Benefits

WIDE RANGE OF TELECOM MASKS
TC1 provides a total of 25 masks:

- 6 from ANSI T1.102-1987

- 17 from CCITT G.703

- 2 from the ISDN I.403

EASY INSTALLATION
Simply transfer the requested template from the TC1 card or disk to the scope's internal memory and you are ready for testing.

EASY TO USE
Use the built-in Pass/Fail utility to set the oscilloscope to Fail as soon as the acquired signal leaves the mask, then start the acquisition.

CUSTOM TOLERANCES
Masks can be customized by adding extra vertical or horizontal tolerances.

FLEXIBLE TEST ROUTINES
Up to 4 different mask tests can be carried out at the same time. They can also be combined with pulse parameter tests chosen from a list of 32 (rise-time, frequency, amplitude etc.).

FLEXIBLE ACTIONS
If the signal fails, the user can select any of the following procedures:

- Stop the acquisition and show the failed trace.

- Store the signal in internal memory.

- Store the signal on the PCMCIA memory card.

- Store the signal on the 3.5" DOS floppy disk.

- Make a screen dump to a printer or plotter, or to the card/disk for future use in your word processor.

- Generate a "beep".

- Send a TTL pulse from the "CAL OUT" BNC connector.

- Send an SRQ to the GPIB port.

Specifications

STANDARD	DATA RATE	FILE NAME	FILE SIZE
ANSI-DSX-1C	3.152 Mbit/s	DSX1CF5	4402
ANSI-DSX-1 NEW	1.544 Mbit/s	DSX1F1	3600
ANSI-DSX-1 OLD	1.544 Mbit/s	DSX1F2	3601
ANSI-DSX-2	6.312 Mbit/s	DSX2F7	4400
ANSI-DSX-3	44.736 Mbit/s	DSX3F8	4401
ANSI-T1.403	1.544 Mbit/s	DS1F2	3614
CCITT-G.703	1.544 Mbit/s	G703F10	4390
CCITT-G.703	6.312 Mbit/s	G703F11	4389
CCITT-G.703	6.312 Mbit/s	G703F12	4389
CCITT-G.703	32.064 Mbit/s	G703F13	4390
CCITT-G.703	44.736 Mbit/s	G703F14	4390
CCITT-G.703	2.048 Mbit/s	G703F15	4389
CCITT-G.703	8.448 Mbit/s	G703F16	3589
CCITT-G.703	34.368 Mbit/s	G703F17	4390
CCITT-G.703	139.264 Mbit/s	G703F19	3591
CCITT-G.703	139.264 Mbit/s	G703F20	3591
CCITT-G.703	97.728 Mbit/s	G703F22	4394
CCITT-G.703	155.520Mbits	G703F24	4414
CCITT-G.703	155.520Mbits	G703F25	4414
CCITT-G.703	64 Kbit/s	G703F5A	4400
CCITT-G.703	64 Kbit/s	G703F5B	3601
CCITT-G.703	64 Kbit/s	G703F8	4397
CCITT-G.703	64 Kbit/s	G703F9	3599
CCITT-I.430	192 Kbit/s	I430F13	3588
CCITT-I.430	192 Kbit/s	I430F14	3588

Ordering Information

93XX-MC-TC1	Telecom Templates on a 512K PCMCIA card. Requires the 93XX-MC01/04 card-reader option
93XX-FD-TC1	Telecom Templates on a 3.5" DOS floppy disk. Requires the 93XX-FD floppy-drive option.
PP 090	75 Ω to 50 Ω ProBus Adaptor

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

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GERMANY	LeCroy GmbH	06221.83.10.01
ITALY	LeCroy SRL	06.336.797.00
JAPAN Osaka	LeCroy Japan	0816.330.0961
JAPAN Tokyo	LeCroy Japan	0813.3376.9400
SWITZERLAND	Geneva	022.719.21.11
SWITZERLAND	Lenzburg	064.51.91.81
United Kingdom	LeCroy Ltd	(0235) 533114

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Specifications subject to change without notice

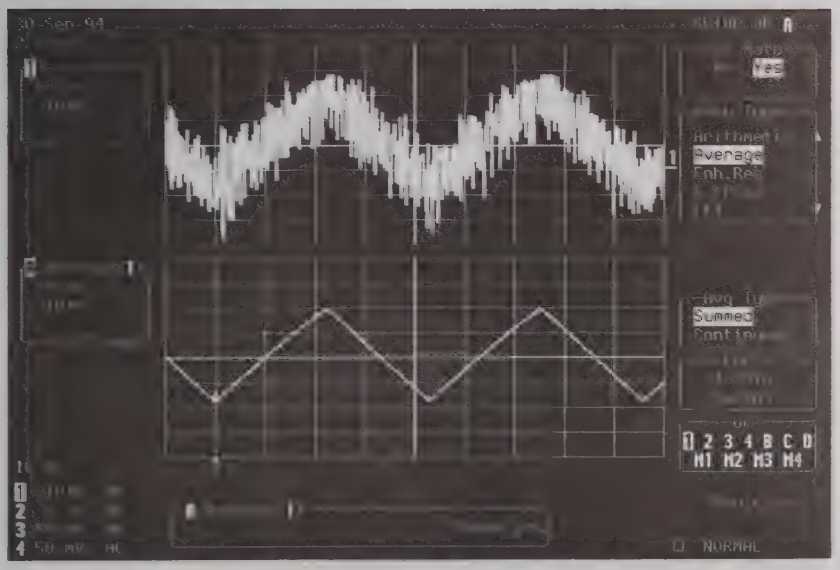
LeCroy

The Digital Scope Specialists

WP01 Waveform Processing Firmware for the 9300 Family of Digital Oscilloscopes

Main Features

- High–precision averaging up to 1 million sweeps
- Extended digital filtering capabilities
- Rescale function, with (ax + b) correction factor
- Envelope mode
- Integration
- Differentiation
- Log(e) and Log(10)
- Exp(e) and Exp(10)
- Absolute, Reciprocal
- Square, Square root
- Powerful function chaining feature



Summed Averaging is applied to the signal in Channel 1, to remove random noise. Trace A shows the result after 377 sweeps: the noise has practically disappeared.

The LeCroy WP01 Waveform Processing package features a powerful toolset that extends the processing power inside the 9300 oscilloscope, well beyond the capabilities of a traditional instrument.

In fact, all the processing is built-in to eliminate the need for external computers and controllers. High-speed microprocessors are used to ensure real-time updates of computed waveforms on the screen.

The package is fully programmable over GPIB or RS-232-C interfaces, and hard copies can be made directly on to a wide range of printers (including the optional internal printer), plotters or graphic formats.

Features and Benefits

EXTENSIVE SIGNAL AVERAGING

WP01 offers two powerful, high-speed averaging modes that can be used to reduce noise and improve the signal-to-noise ratio. Vertical resolution can be extended by several bits to improve dynamic range and increase the overall input sensitivity to as much as 50 µV/div.

Summed averaging, where up to 1,000,000 sweeps are repeatedly summed, with equal weight, in a 32-bit accumulation buffer for improved accuracy. The accumulated result is then divided by the number of sweeps.

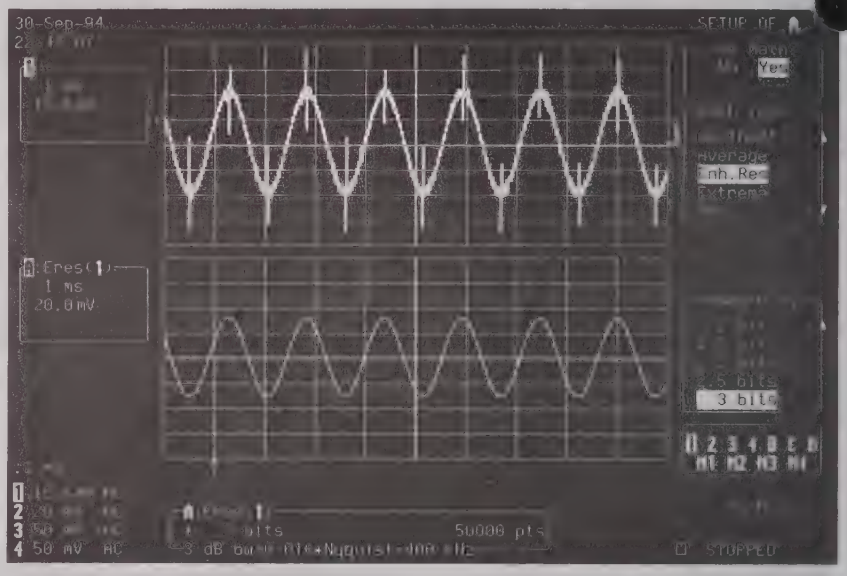
Continuous/exponential averaging where a weighted addition of successive waveforms can be performed with weighting factors from 1:1 to 1:1023. The averaging goes on indefinitely with the contribution of "older" sweeps gradually decreasing. The method is particularly appropriate to reduce noise on signals drifting very slowly in time or amplitude.

ENHANCED RESOLUTION BY DIGITAL FILTERING

Allows low-pass F.I.R. filtering of the digitized signals, with 6 different cut-off frequencies per sampling rate setting. As a result, the vertical resolution of the captured signals – single-shot or repetitive – increases from 8 bits to 11 bits in 0.5-bit steps. This feature is ideal to strip off unwanted high-frequency noise on transient events.

RESCALING

Allows an input signal to be rescaled using a (ax + b) correction factor to compensate for gain and offset. This is very useful when dealing with various types of transducers, to read the correct temperature or pressure value directly from the scope's cursor.



High-frequency glitches in Channel 1 have been dramatically reduced in Trace A by using the low-pass filtering properties of the Enhanced Resolution Function.

ENVELOPE MODE

Shows the signal envelope by retaining only the highest and lowest amplitudes for every sampling interval, over a user-definable number of sweeps. Ideal to visualize the time or amplitude jitter in a signal.

POWERFUL MATH TOOLSET

In addition to the basic arithmetic functions found in the standard models (+,–,×,÷), WP01 adds an impressive set of functions such as integration, differentiation, logarithms and exponential – in both bases 10 and e – square, square root, reciprocal, absolute, and a sin(x)/x interpolation function.

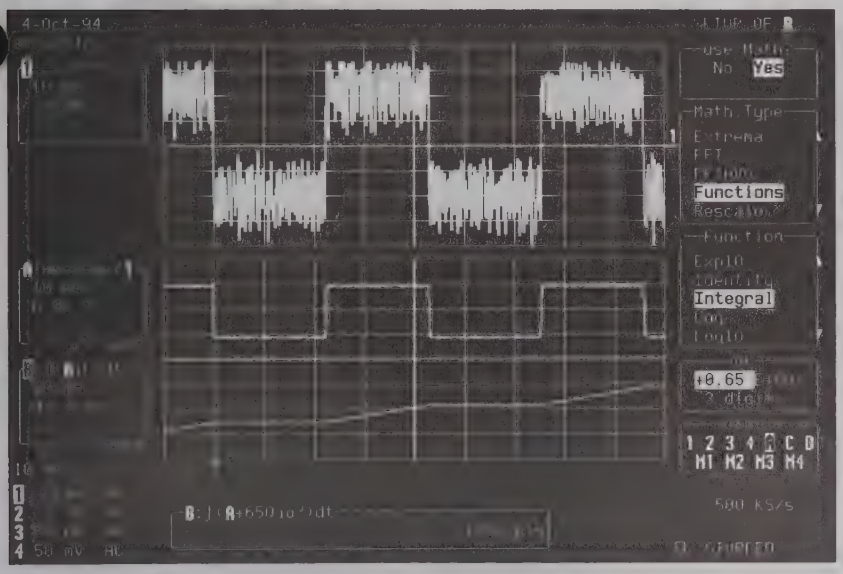
All these functions are updated automatically each time a new waveform is acquired, showing a "live" representation of a computed trace. This would be impossible to achieve on a separate computer.

FUNCTION CHAINING

When more than one math function is needed in the equation, WP01 supports function chaining, and allows the user to multiply, for instance, the "Voltage" and the "Current" channel and to integrate the result to get an instantaneous energy curve.

REMOTE CONTROL

All of the waveform processing can be controlled via GPIB or RS-232-C remote control. And the function traces do not even need to be called up on screen to be updated, an important feature that speeds up the computation.



To illustrate WP01's function chaining ability, the noisy signal in Channel 1 has been averaged in Trace A to remove undesired noise, and the result integrated in trace B.

WP01 Specifications

GENERAL

Max. number data points: only limited by the available amount of system memory (indicated in the "memory used" status menu).
Min. number data points: Data points can be reduced down to 50 in the processing function to improve update rate.
Vertical Zoom: supported, 50× maximum.
Horizontal Zoom: supported, maximum zooming to a point where 50 samples of the source trace occupy the full screen.
Maximum Sensitivity: 50 µV/div after vertical expansion.

SUMMATION AVERAGING

Number of Sweeps: 1 to 1,000,000.
Speed: up to 200,000 points/s.

CONTINUOUS AVERAGING

Possible Weighting Factors: 1:1, 1:3, 1:7, 1:15, 1:31, 1:63, 1:127, 1:255, 1:511 and 1:1023.

ENHANCED RESOLUTION

Choice of six low-pass filters to improve vertical resolution improvement from 8 to 11 bits in 0.5-bit steps.
Resulting bandwidth:

0.5 bit	0.5 × Nyquist BW
1 bit	0.241 × Nyquist BW
1.5 bit	0.058 × Nyquist BW
2 bit	0.029 × Nyquist BW
2.5 bit	0.016 × Nyquist BW

Nyquist BW = 1/2 × sample frequency.

RESCALE

ax + b rescaling with a and b ranging from ±0.00001 E-15 to ±9.99999 E+15

ARITHMETIC

Addition, subtraction, multiplication and ratio on any two waveforms.

FUNCTIONS

Identity, negation, integration (including additive constant), differentiation, square, square root, logarithm and exponential (base e and 10), sin x/x, reciprocal and absolute value of any waveform.

EXTREMA

Shows the signal envelope by retaining only the highest and lowest amplitudes for every sampling interval. Logs all extreme values of a waveform over a programmable number of sweeps. Maxima and minima can be displayed together, or separately by choosing *roof* or *floor* traces.
Number of Sweeps: 1 to 1,000,000.

FUNCTION CHAINING

Up to four functions can be automatically chained using traces A, B, C and D. Using memories M1 to M4 for intermediate results, any number of operations can be chained manually or via remote control.

REMOTE CONTROL

All controls and waveform processing functions are fully programmable using simple commands over the oscilloscope's GPIB or RS-232-C interfaces.

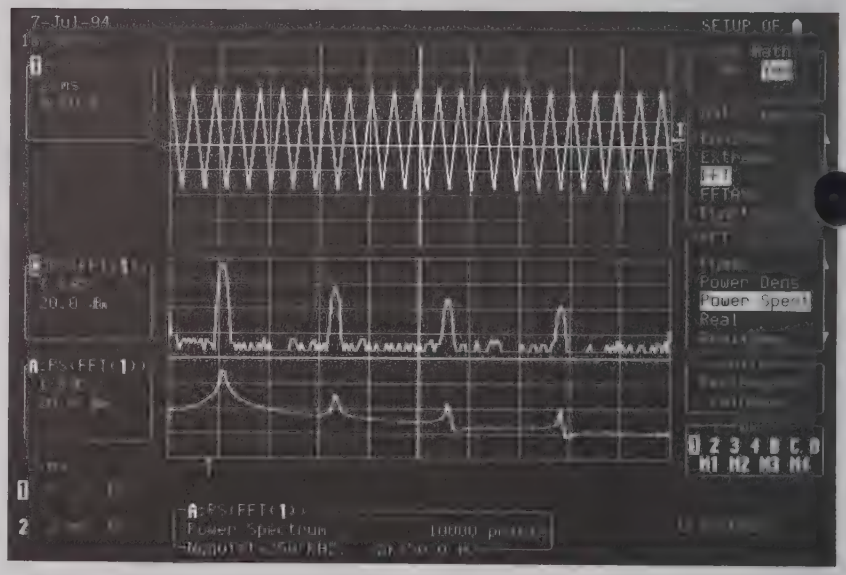
LeCroy

The Digital Scope Specialists

WP02 Spectrum Analysis Firmware for the 9300 Family of Digital Oscilloscopes

Main Features

- Frequency range from DC up to the instrument's full bandwith
- Simultaneous FFTs on up to 4 channels
- Frequency resolution down to 100 µHz
- Frequency domain averaging
- Wide selection of scaling formats
- 5 window functions
- Up to 5 1000-point FFTs per second
- Full support of cursors and automatic waveform parameters
- Full PASS/FAIL testing support



Adding the WP02 Spectrum Analysis Package to the 9300 family of digital oscilloscopes provides a fast and economical solution to frequency domain applications.

The WP02 Spectrum Analysis package provides the 9300 oscilloscope with a powerful frequency-domain toolset that extends its processing capabilities, well beyond the realm of a standard instrument. In fact, all the processing is built-in to eliminate the need for external computers and controllers.

High-speed microprocessors are used to ensure real-time update of computed waveforms on the screen. Fast Fourier Transforms (FFTs) rapidly convert time domain waveforms into frequency domain records to reveal valuable spectral information such as phase, magnitude and power.

The package is fully programmable over GPIB and RS-232-C interfaces, and hardcopies can be made directly on to a wide range of printers (including the optional internal printer), plotters or graphic formats.

Features and Benefits

WHY FFT IN A SCOPE?
The FFT package on a LeCroy 9300 has at least four clear advantages over common swept spectrum analyzers:

- It can show the spectrum of a **transient signal**.
- Both **time and frequency** information can be monitored **simultaneously**.
- Phase information is **available**.
- The price is **attractive**.

It has two definite advantages over FFT analyzers:

- It can show higher-frequency components.
- Both **time and frequency** information can be monitored **simultaneously**.
- The price is **attractive**.

BROAD SPECTRUM COVERAGE
The frequency spectrum ranges from DC to the full bandwidth of the oscilloscope for repetitive signals, and to one half of the maximum sampling frequency for transients.

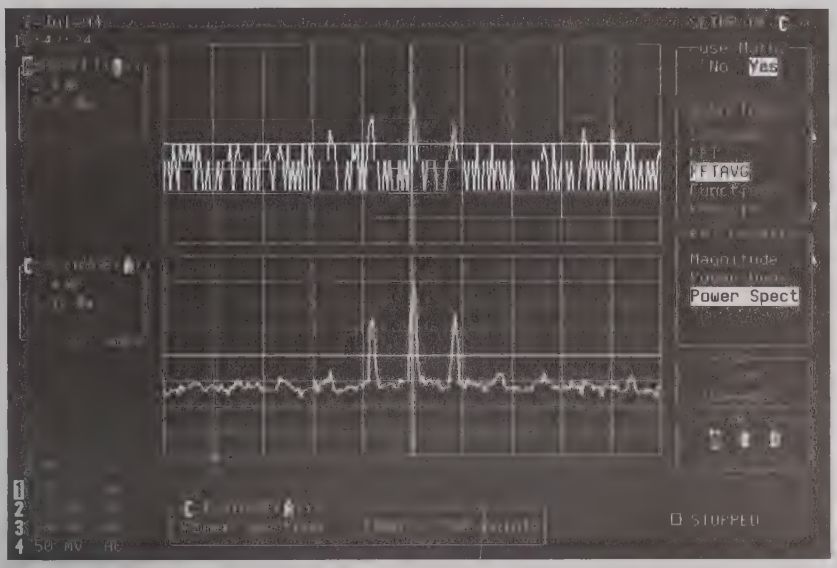
MULTI-CHANNEL ANALYSIS
All input channels can be analyzed simultaneously to look for common frequency-domain characteristics in independent signals.

VERSATILE SCALING FORMATS
Frequency-domain data may be presented as magnitude, phase, real, imaginary, complex, log-power and log-PSD (Power Spectral Density).

STANDARD WINDOW FUNCTIONS
Use rectangular for transient signals; von Hann (Hanning) and Hamming for continuous waveform data; Flattop for accurate amplitude measurements; Blackman-Harris for maximum frequency resolution.

FREQUENCY DOMAIN AVERAGING
Up to 50,000 FFT sweeps may be averaged to reduce base-line noise, enable analysis of phase-incoherent signals or signals which cannot be triggered on.

FREQUENCY CURSORS AND WAVEFORM PARAMETERS
Cursors can be set on the FFT trace to show up to 0.004% frequency resolution (up to 0.002% for 10,000 point memory) and measure power or voltage differences to 0.2% of full scale. Automatic waveform parameters can also be applied to FFT traces.



An FFT (top trace) with spectral components buried in noise. By applying the power averaging function (lower trace), all the baseline noise is removed, and the spectral components of an AM signal are clearly visible..

PASS/FAIL TESTING ON FFT TRACES
PASS/FAIL testing is fully supported on FFT traces. The instrument can be setup to test incoming spectra against tolerance masks. In case the signal "fails", the instrument can be programmed to perform a choice of actions (screen dump, waveform storage, pulse out, etc.)

RESCALING
Allows an input signal to be rescaled using a (ax + b) correction factor to compensate for gain and offset. This is very useful when dealing with various types of transducers, to read the correct temperature or pressure value directly from the scope's cursor.

FUNCTION CHAINING
When more than one math function is needed in the equation, WP02 supports function chaining, and allows the user to multiply, for instance, the "Voltage" and the "Current" channel and to integrate the result to get an instantaneous energy curve.

REMOTE CONTROL
All of the waveform processing can be controlled via GPIB or RS-232-C remote control. And the function traces do not even need to be called up on screen to be updated, an important feature that speeds up the computation.

FOURIER PROCESSING
Fourier processing is a mathematical technique which enables a time-domain waveform to be described in terms of frequency-domain magnitude and phase, or real and imaginary spectra. It is used, for example, in spectral analysis where a waveform is sampled and digitized, then transformed by a Discrete Fourier Transform (DFT). Fast Fourier Transforms (FFT) are a set of algorithms used to reduce the computation time (by better than a factor of 100 for a 1000 point FFT) needed to evaluate a DFT.

WP02 Specifications

GENERAL

Max. number data points: only limited by the available amount of system memory (indicated in the "memory used" status menu).
Min. number data points: Data points can be reduced down to 50 in the processing function to improve update rate.
Vertical Zoom: supported, 50× maximum.
Horizontal Zoom: supported, maximum zooming to a point where 50 samples of the source trace occupy the full screen.
Maximum Sensitivity: 50 μV/div after vertical expansion.
Frequency Range:
Repetitive signals: DC to instrument bandwidth.
Transient signals: DC to 1/2 maximum single-shot sampling frequency
Frequency Scale Factors: 0.05 Hz/div to 0.2 GHz/div in a 1-2-5 sequence.
Frequency Accuracy: 0.01%.

AMPLITUDE AND PHASE

Amplitude Accuracy: Better than 2%. Amplitude accuracy may be modified by the window function (see the window functions table).
Signal Overflow: A warning is provided at the top of the display when the input signal exceeds the ADC range.
Number of Traces: Time domain and frequency domain data can be displayed simultaneously (up to 4 waveforms).
Phase Range: -180° to +180° .
Phase Accuracy: ±5° (for amplitudes > 1.4 div).
Phase Scale Factor: 50° /division.

SPECTRUM SCALING FORMATS

Horizontal Scale: *Linear, in Hz*
Vertical Scales:
Power Spectrum *in dBm (1 mW into 50 Ω).*
Power Spectral Density *(PSD) in dBm.*
Magnitude, Real, Imaginary: *Linear, in V/div*
Phase Display: *Linear, in degrees.*

WINDOW FUNCTIONS

Rectangular, von Hann (Hanning), Hamming, Flattop and Blackman-Harris (see table below).

FFT EXECUTION TIMES*

100 points in less than 0.03 s.
1000 points in less than 0.3 s.
10000 points in less than 3 s.
** Only valid for 9350, 9360, and 9304/10 with MWP option. Other models, add 50%*

FREQUENCY DOMAIN POWER AVERAGING

Summation averaging of power, PSD or magnitude for up to 50,000 sweeps.

FUNCTION CHAINING

Up to four functions can be automatically chained using traces A, B, C and D. Using memories M1 to M4 for intermediate results, any number of operations can be chained manually or via remote control.

REMOTE CONTROL

All controls and waveform processing functions are fully programmable using simple commands over the oscilloscope's GPIB or RS-232-C interfaces.

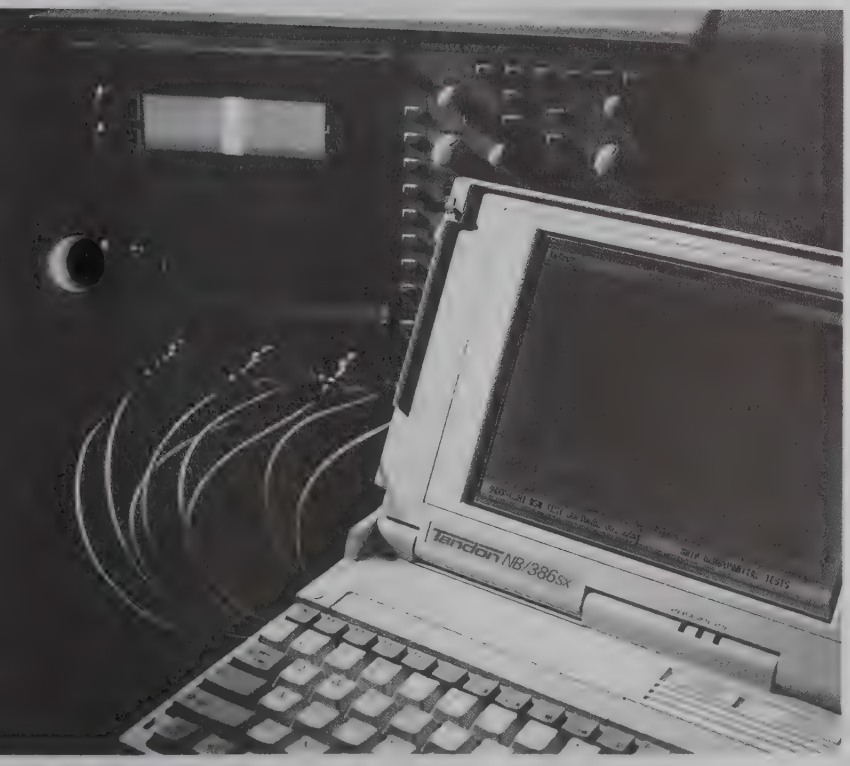
FILTER PASS BAND AND RESOLUTION

Window type	Filter bandwidth at -6 dB [freq. bins]	Highest side lobe [dB]	Scallop loss [dB]	Noise bandwidth [freq. bins]
Rectangular	1.21	-13	3.92	1.0
von Hann	2.00	-32	1.42	1.5
Hamming	1.81	-43	1.78	1.36
Flattop	1.78	-44	0.01	2.96
Blackman-Harris	1.81	-67	1.13	1.71

Filter Bandwidth at -6 dB characterizes the frequency resolution of the filter.
Highest Side Lobe indicates the reduction in leakage of signal components into neighboring frequency bins.
Scallop Loss is the loss associated with the picket fence effect.

LeCroy
Innovators in Instrumentation

LeCalsoft–Calibration Software for LeCroy Digital Oscilloscopes



The LeCalsoft package enables a fast and thorough verification of all key specifications.

Main Features

- **Traceability to reference standards**
- **Computer check of key specifications**
- **Computer–aided readjustment**
- **Fully automated configurations available**
- **Supports all 93XX and 94XX models**
- **IBM® PC–AT compatible**

General

The LeCroy LeCalsoft (94XXCS05) test and calibration package provides a convenient, unambiguous check of LeCroy oscilloscopes. Designed for users who require traceability to reference standards (NIST, etc.), this package is ideally suited for use in calibration laboratories where the oscilloscopes are checked at fixed intervals.

Results of the calibration check are fully documented on hard copy, or they can be archived on hard disk or diskette.

LeCalsoft works on any PC compatible with the IBM®–AT standard. It controls the oscilloscope and the calibration sources through a National Instruments® GPIB interface.

Features

Calibration Check

All the essential specifications of the Digital Oscilloscope, such as bandwidth, linearity, noise, trigger, timebase and effective–bit count are tested. Deviations from nominal values are calculated and displayed on the screen, printed, or archived on hard disk or diskette.

Comprehensive Documentation of the Test Results

At the end of each calibration check, two types of documentation are available: a long form printout which gives details of the results of all the tests executed, and states whether or not the results are within the specifications, and a short form printout which gives a summary of the test results.

Calibration Traceable to National Standards (NIST, etc.)

By using signal sources traceable to a standard, the calibration will be traceable to the same standard, provided the relevant documentation is maintained.

Manual and Automated Calibration Check

Both manual operation with computer assistance, and automated operation are possible. Automated operation requires programmable multiplexer and signal sources. See the list of supported devices below.

Assisted Adjustment of the Oscilloscope

A computer–aided adjustment procedure is also provided. By following instructions on the screen, the trained technician is guided through the adjustments required to correct the settings of the oscilloscope so that it is within the specifications.

Calibration Certificate

On request, LeCroy will perform calibration traceable to National Standard Organizations. Calibration certificates are provided as part of this service.

Functional Description

Calibration Practice

LeCroy oscilloscopes are auto–calibrating digital oscilloscopes and therefore do not require regular calibration like analog oscilloscopes. However, for users who require traceability to reference standards (such as those provided by the National Institutes of Standards and Technology), and for calibration laboratories which must inspect incoming instruments and perform recalibration at prescribed intervals, the LeCalsoft computer–aided test and calibration packages provide an easy solution.

Under guidance of the LeCalsoft program, some adjustments to the oscilloscope can be made by an electronics technician. However major deviations from specifications usually require repair by a trained service engineer. LeCroy regularly schedules training classes. If no in–house trained person is available, the nearest LeCroy service center can carry out repairs and calibration, and provide traceability to reference standards.

Using the LeCroy LeCalsoft Packages

For calibration checking, digital oscilloscopes have a great advantage over analog oscilloscopes because waveforms can be transferred to a host computer. This simplifies the calibration procedure enormously, makes it potentially faster and allows an extensive range of tests with unambiguous interpretation of the results.

LeCalsoft performs an extensive series of tests which verify the specifications of the oscilloscope. It includes many tests relevant to analog scopes such as Noise and Linearity tests. Although these tests are difficult and time consuming on an analog oscilloscope, they can be computer controlled and are quickly and easily performed on a digital oscilloscope. Tests which are specific to digital oscilloscopes, such as Sinefit tests are also included.

The various test options in LeCalsoft are presented to the operator in the form of a simple menu system. The user has the choice of performing an automated calibration check of the oscilloscope, or individually testing any of the specifications. Some of the tests require the use of high–quality external signal generators. The user receives instructions on the screen when it is necessary to change the cable connections, but apart from this minor intervention, the tests are fully computer controlled when supported GPIB–programmable instruments are used.

Supported Instrumentation

LeCalsoft software works on any AT–compatible equipped with a math coprocessor and a National Instruments GPIB interface. Automated calibration checking is possible using a set of instruments from the following list. (For an automated calibration check, either the LeCroy or Keithley programmable multiplexer is required to feed the calibration signals to the oscilloscope input.)

RF sinewave generators:
- Marconi 2019A, 2022C, 2030, 2031
- Fluke 6060B, 6061A
- Hewlett–Packard 8642A, 8642B
- Rohde & Schwarz SMX

AF sinewave generators:
- Marconi 2019A, 2022C, 2030, 2031
- Hewlett–Packard 8642A, 8642B
- Rohde & Schwarz SMX
- Tektronix FG5010
- LeCroy AFG 9100

DC Precision Power Supply:
- Tektronix PS5004
- Datron 4708 Autocal Multifunction Standard

Fast Pulse Generator:
- Tektronix CG5001/CG551AP

Power Meters:
- Hewlett–Packard HP436A, HP437B

Multiplexers:
- Keithley 199 SYSTEM DMM/ SCANNER with LeCroy interface board.
- LeCroy 4951, 4973–1, 4973–2 Multiplexers.

Frequency standard:
- WWV or HBG1500

Recommended Accessories

A full kit of calibration connectors and interfaces is available from LeCroy. It includes all the necessary cables, adapters, splitters and filters, as well as the Programmable Multiplexer. Also available is a repair package including special tools, board extenders, etc., for computer–aided adjustment.

Use of Other Instruments

It is possible to perform the calibration check with some other unsupported signal sources. However, the user is then required to set up these instruments manually and to perform one measurement at a time. The LeCalsoft package guides the user step by step, and controls the oscilloscope data acquisition and the computation of the results.

LeCalsoft compares the signal measured by the oscilloscope with the signal it would expect to receive from the generator. Warning messages are displayed whenever tolerances are exceeded. Some of the adjustments may be carried out by the user when the test sequence is finished. In this case, the software will guide the user through the correct adjustment procedure. At the end of the calibration check, a printout can be generated to list the results.

Specifications

Computer Required: Any PC compatible with the IBM–AT standard, and equipped with a mathematical coprocessor and a National Instrument Inc. GPIB interface.

Operating System: DOS 3.0 upward

Medium: $3^1/_2$" 1.44 Mb
$5^1/_4$" 1.2 Mb diskette

Major Tests Supported by LeCalsoft

Internal

To ensure proper calibration of the oscilloscope, internal auto–calibration tests are automatically executed during normal operation. This standard sequence of internal auto calibration tests is initiated by the software and the results are transferred to the PC for analysis.

The tests are:

- Calibration of the resolution of the time–to–digital converter with respect to the system clock
- Determination of the gain constants of the input amplifiers
- Offset compensation versus gain variation
- Global internal non–linearity
- General functionality check

Bandwidth

To calculate the bandwidth, the amplitudes of sine waves of increasing frequencies are measured. The sine wave generator is first set to 500 kHz with an amplitude 75% of full screen, i.e. ±3 vertical divisions. The frequency is then swept up to the point where an amplitude drop of 3 dB is observed. This indicates the bandwidth.

This test is executed on all channels for 1 MΩ and 50 Ω input impedance and for all vertical sensitivities. It requires a sine wave generator with good flatness.

Generators supported under program control are listed on page 2.

Linearity

15 different known voltages, varying from 5% to 95% of full screen, are applied by the external voltage reference source. For each voltage value, a full waveform is acquired, and the mean value is compared to the known input voltage. The linearity is determined through a linear regression fit to the 15 measurements.The slope, the offset and the chi–square of the fit are computed.

With the linearity test, many other related tests are performed: response time of the overload protection of the 50 Ω input, linearity of the variable gain calibration, range and linearity of the offset setting, and quality of the input coupling.

This procedure is executed on all channels for both 1 MΩ and 50 Ω input impedance. The test requires a DC source with a precision and time stability of 0.1%, a voltage range of 0 V to 20 V adjustable in steps of 5 mV, and an output current capability of 300 mA.

Power supplies supported under program control are listed on page 2.

Noise

The noise tests are executed on all channels for both 1MΩ and 50 Ω input impedance, with AC and DC coupling, five different time–base settings, and open inputs. Full waveforms are acquired with different offset values. The peak–to–peak as well as the RMS values of each measurement are computed, and the maximum values are recorded. The program also indicates the occurrence of any "flyers", i.e. short noise peaks generated by the ADC's.

The noise tests also include:

- checking the linearity of the variable offsets of all channels between 2.5% and 97.5% of full screen.
- checking the stability of the ground line when switching the inputs between GROUND and DC coupling modes.

Rise time/Overshoot

Executed on all channels for both 1MΩ and 50 Ω input impedance, these tests measure the rise time of the oscilloscope response to the input voltage step, as well as the amount of pre–shoot and overshoot. They require a voltage step generator with calibrated fast rise–time amplitude.

The Voltage Step Generator supported under program control is the Tektronix CG5001.

Sinefit

The performance of the analog–to–digital converter is evaluated in terms of the number of effective bits (a measure of the signal–to–noise ratio). It is measured on all channels, at a sensitivity of 50 mV/div., by applying a pure sine wave at varying frequencies and timebase settings

This test is a measurement of dynamic linearity. It shows the effect of such errors as noise, non–linearities and aperture jitter.

Timebase

The timebase test compares the internal clock with a very precise and stable external timebase reference (clock generator) such as the WWV standard or HBG 1500.

Trigger

The trigger capabilities are tested for all possible configurations. These include:

- Internal and external trigger sources
- DC, AC, HF–reject, and LF–reject couplings
- Trigger level settings in all slope modes.

ORDERING INFORMATION

LeCalsoft and Options

94XXCS05	Complete LeCalsoft for 93XX and 94XX (software and hardware), incl. cables, switch card, adapters, etc.
94XXCS01	LeCalsoft software for 93XX and 94XX
9400CS01	Calsoft software for 9400A

LeCalsoft Accessories

93XXKCS02	Calibration kit for 93XX and 94XX
9400KCS02	Calibration kit for 9400A

Individual system components available on request

U.S. REGIONAL SALES OFFICES 1 800–5–LeCroy (1–800–553–2769):

automatically connects you to your local sales office.

LeCroy has sales engineers in most major metropolitan areas, coordinated through a system of five Regional Sales and Service Offices:

NORTHEAST: 700 Chestnut Ridge Rd, Chestnut Ridge, NY 10977

SOUTHEAST: 410 Ware Blvd Ste 716, Tampa, FL 33619

FARWEST: 5912 Stoneridge Mall Rd Ste 150, Pleasanton, CA 94588

CENTRAL:

Midwest: 4811 S 76th St Ste 415, Greenfield, WI 53220

Southwest: 14800 Central Ave SE Albuquerque, NM 87123

WORLDWIDE

Argentina: Search SA, (01) 394–5882
Australia: Scientific Devices Pty Ltd, (03) 579–3622
Austria: Dewetron GmbH, (0316) 391804
Benelux: LeCroy BV (0031) 4902–89285
Brazil: ATP–Hi–Tek, (011) 421–5477
Canada: LeCroy Canada Inc, (514) 928–4707
Denmark: Lutronic, (42) 459 764
Eastern Europe: Elsinco GmbH, Vienna, 222 812 1751
Finland: Labtronic OY, (80) 847 144
France: LeCroy Sarl (1) 69 073 897
Germany: LeCroy GmbH, (06221) 831001
Greece: Hellenic S/R Ltd., (01) 721 1140
Hong Kong: Euro Tech (Far East) Ltd, (052) 814–0311
India: Electronic Ent, (022) 4137096
Israel: Ammo, (03) 453157
Italy: LeCroy Srl, Roma (06) 300.97.00 or 331 31 46; Milano (02) 2940 5634
Japan: LeCroy Japan, Tokyo (0081) 33 376 9400; Osaka (0081) 6 330 0961
Korea: WOOJOO Hi–Tech Corp, (02) 449–5472
Mexico: Nucleoelectronica SA, (05) 5593 6043
New Zealand: E.C. Gough Ltd, (03) 798–740
Norway: Avantec AS (02) 630520
Pakistan: Electronuclear Corp, (021) 418087
Portugal: M.T. Brandao, Lta, (02) 815680
Singapore: Sing. Electr. and Eng. Ltd (65) 481–8888
S. Africa: Westplex Test & Meas. (011) 787 0473
Sweden: MSS AB, (0764) 68100
Switzerland: LeCroy SA (064) 51 91 81
Taiwan: Topward El.Inst., Ltd, (02) 601 8801
Thailand: Measuretronix Ltd, (02) 374 2516
United Kingdom: LeCroy Ltd, (0235) 533 14

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Innovators in Instrumentation

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SECTION 3 Block Diagram and Sub-Assemblies

9360 & 9361 Digital Oscilloscope

3.1 9360 Sub-Assemblies

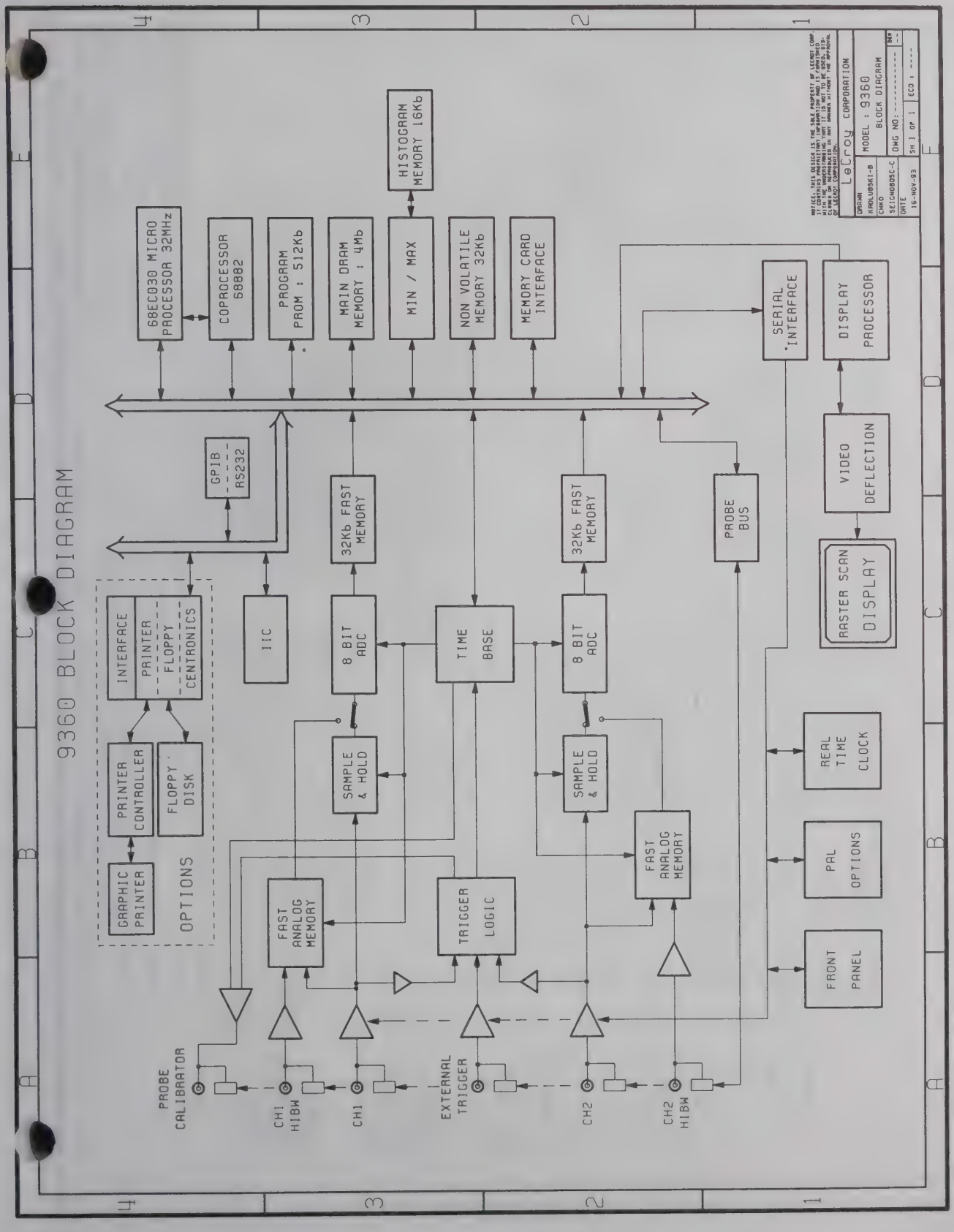
F9302-1-4	Processor, 4 Mbyte RAM
F9360-3	Main card, Dual Channel Front end, ADC, Time base, 5 GS/s
F9300-4	GPIB + RS232 interface
F9350-5	Dual channel front panel
93XX-PS1715	Power supply +/- 5V, +/- 15V.
93XX-Display	Video, deflection, CRT, yoke
M936X	Mechanical for 9360

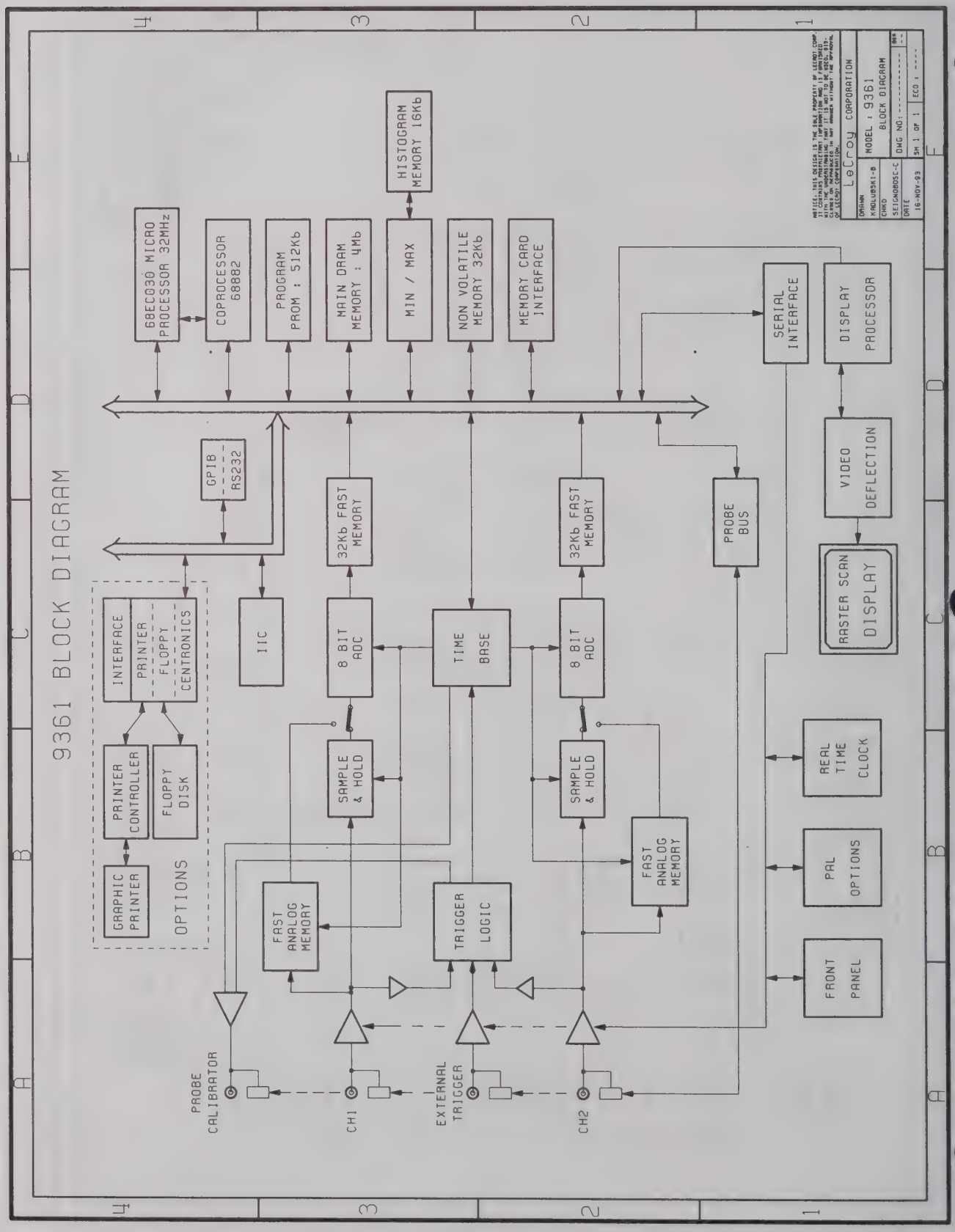
3.2 9361 Sub-Assemblies

F9300-1-2	Processor, 2 Mbyte RAM
F9361-3	Main card, Dual Channel Front end, ADC, Time base, 2.5 GS/s
F9300-4	GPIB + RS232 interface
F9350-5	Dual channel front panel
93XX-PS1715	Power supply +/- 5V, +/- 15V.
93XX-Display	Video, deflection, CRT, yoke
M936X	Mechanical for 9361

3.3 9360 & 9361 Hardware Options

936X-FDGP	Graphic Printer & Floppy Disk F9300-6 : Centronics, Floppy, Printer interface F9300-7 : Printer controller
936X-GP01	Graphic Printer F9300-6 : Centronics, Floppy, Printer interface F9300-7 : Printer controller
936X-FD01	Floppy Disk F9300-6 : Centronics, Floppy, Printer interface
936X-HDD	Hard Disk Drive, 130 MB F9300-8 : PCMCIA III, Hard Disk Controller


9360 BLOCK DIAGRAM
68EC030 MICRO PROCESSOR 32MHz
COPROCESSOR 68882
PROGRAM PROM : 512Kb
MAIN DRAM MEMORY : 4Mb
MIN / MAX
HISTOGRAM MEMORY 16Kb
NON VOLATILE MEMORY 32Kb
MEMORY CARD INTERFACE
SERIAL INTERFACE
DISPLAY PROCESSOR
VIDEO DEFLECTION
RASTER SCAN DISPLAY
GPIB
RS232
32Kb FAST MEMORY
32Kb FAST MEMORY
PROBE BUS
INTERFACE
PRINTER
FLOPPY
CENTRONICS
IIC
8 BIT ADC
TIME BASE
8 BIT ADC
PRINTER CONTROLLER
FLOPPY DISK
GRAPHIC PRINTER
OPTIONS
SAMPLE & HOLD
SAMPLE & HOLD
REAL TIME CLOCK
PAL OPTIONS
FRONT PANEL
FAST ANALOG MEMORY
TRIGGER LOGIC
FAST ANALOG MEMORY
PROBE CALIBRATOR
CH1 HIBW
CH1
EXTERNAL TRIGGER
CH2
CH2 HIBW
LeCroy CORPORATION
MODEL : 9360
BLOCK DIAGRAM
DRAWN KROLUBSKI-B
CHKD SEIGNOBOSC-C
DATE 16-NOV-93
DWG NO:
SH 1 OF 1
ECO :

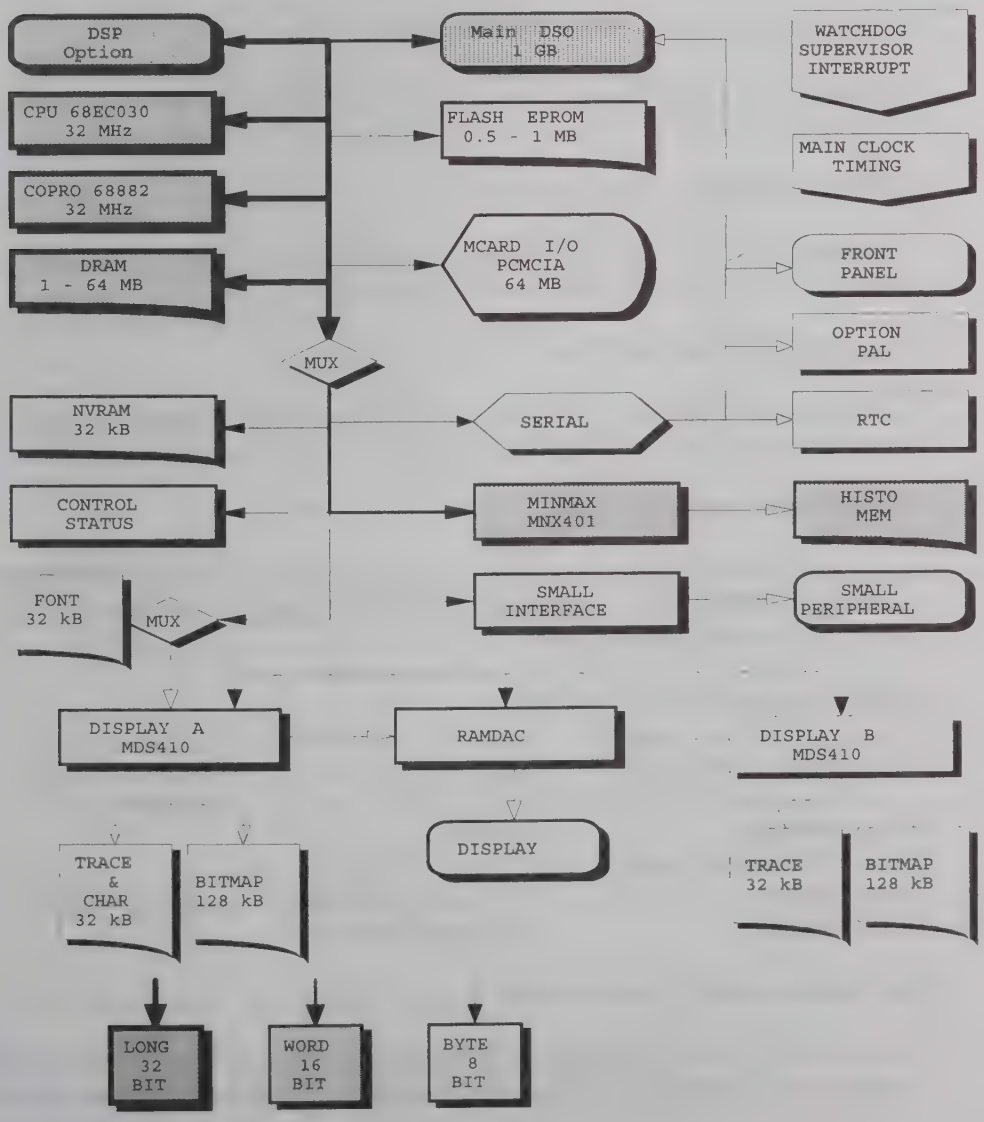

9361 BLOCK DIAGRAM
68EC030 MICRO PROCESSOR 32MHz
COPROCESSOR 68882
PROGRAM PROM : 512Kb
MAIN DRAM MEMORY : 4Mb
MIN / MAX
NON VOLATILE MEMORY 32Kb
MEMORY CARD INTERFACE
HISTOGRAM MEMORY 16Kb
SERIAL INTERFACE
DISPLAY PROCESSOR
VIDEO DEFLECTION
RASTER SCAN DISPLAY
GPIB
RS232
32Kb FAST MEMORY
32Kb FAST MEMORY
PROBE BUS
IIC
8 BIT ADC
8 BIT ADC
TIME BASE
SAMPLE & HOLD
SAMPLE & HOLD
FAST ANALOG MEMORY
FAST ANALOG MEMORY
TRIGGER LOGIC
REAL TIME CLOCK
PAL OPTIONS
FRONT PANEL
INTERFACE
PRINTER
FLOPPY
CENTRONICS
PRINTER CONTROLLER
FLOPPY DISK
GRAPHIC PRINTER
OPTIONS
PROBE CALIBRATOR
CH1
EXTERNAL TRIGGER
CH2
LeCroy CORPORATION
DRAWN
MODEL : 9361
BLOCK DIAGRAM
DWG NO:
SH 1 OF 1
ECO :
DATE
16-NOV-93

SECTION 4 THEORY of OPERATION

4.1 Processor Board : F9302-1-4 for 9360

This processor board is based on to the 68EC030 and 68882 coprocessor, with an internal clock frequency of 32 MHz, and 4 Mbytes memory.
The internal Data Bus is 32 bits wide (DRAM, DSP), the peripheral Data Bus set 8 or 16 bits, and the Address Bus has 32 bits (A0-A30 and A31 for the Min/Max.).

4.1.1 Processor Block Diagram



4.1.2 Parallel Peripherals

DRAM memory : Data bus 32 bits

The DRAM memory of 4 Mbytes (up to 64 Mbytes) is used as the program memory and working memory.
The compacted program of 1MByte stored within the Flash EPROM, IC of 8 Mbit is de-compacted, loaded and executed in the DRAM.

DSP interface : Data bus 32 bits.

An optional Digital Signal Processor is connected to the processor board via a 32 bits address bus.

F9360-3 main board interface : Data bus 16 bits.

The main board is connected to the processor via a 32 bits address bus.
See section 4.3.

Min/Max calculation : Data bus 16 bits.

A gate array MNX401 makes a histogram in its associated 16 Kbytes memory and remembers the minimum and maximum data values it sees.

Flash memory : Data bus 8 bits.

Segmented Flash EPROM of 1 Mbyte (IC of 8 Mbits) contains 16 Kbytes program, executable at power on, and other compacted programs executable in the DRAM.

Memory card : Data bus 8 bits.

An interface is implemented to support an external memory card, PCMCIA / JEIDA 4, type 68 pins, whose size can range from 16 Kbytes to 64 Mbytes, with the extension to support flash memory and I/O cards.

Graphic processor : Data bus 8 bits.

The graphic processor of the raster scan display is a gate array designated MDS410.

Clock frequency	:	48 MHz.
Trace and characters memory	:	32 Kbytes (SRAM).
Bitmap memory	:	128 Kbytes (BMRAM).
Character font	:	32 Kbytes (SRAM).

Non volatile memory : Data bus 8 bits.

A static RAM of 32 Kbytes (IC of 256 Kbits) contains the parameters used at power on to initialize the scope and the stored panels parameters. This memory is battery backed up

DAC command of the display intensity : Data bus 8 bits.

The control of the display intensity is done by a RAMDAC, up to 8 traces.

Status and command registers : Data bus 8 bits.

Status (read) and command (write) registers of 12 bits address, control the memory card and front panel interface during the boot process or after a RESET.

4.1.3 Serial Peripherals

The processor controls the digital and analog section with a dual serial controller.

DAC's registers (read/write)
Front panel registers (68HC05C4)
RTC registers (68HC68T1)
Probe detection
Software options (GAL)
Front end control
Trigger control (MTR408)

Real time clock

Integrated circuit 68HC68T1 (Motorola or RCA).

Resolution	: 1 sec to 99 years.
Clock frequency	: 32.768 KHz.
Non volatile memory	: 32 Kbytes.
Data & Address bus	: 8 bits.
Interrupt level	: 5.

4.1.4 External Interfaces

Serial RS232 interface and Parallel GPIB interface.
See F9300-4 description, section 4.4.

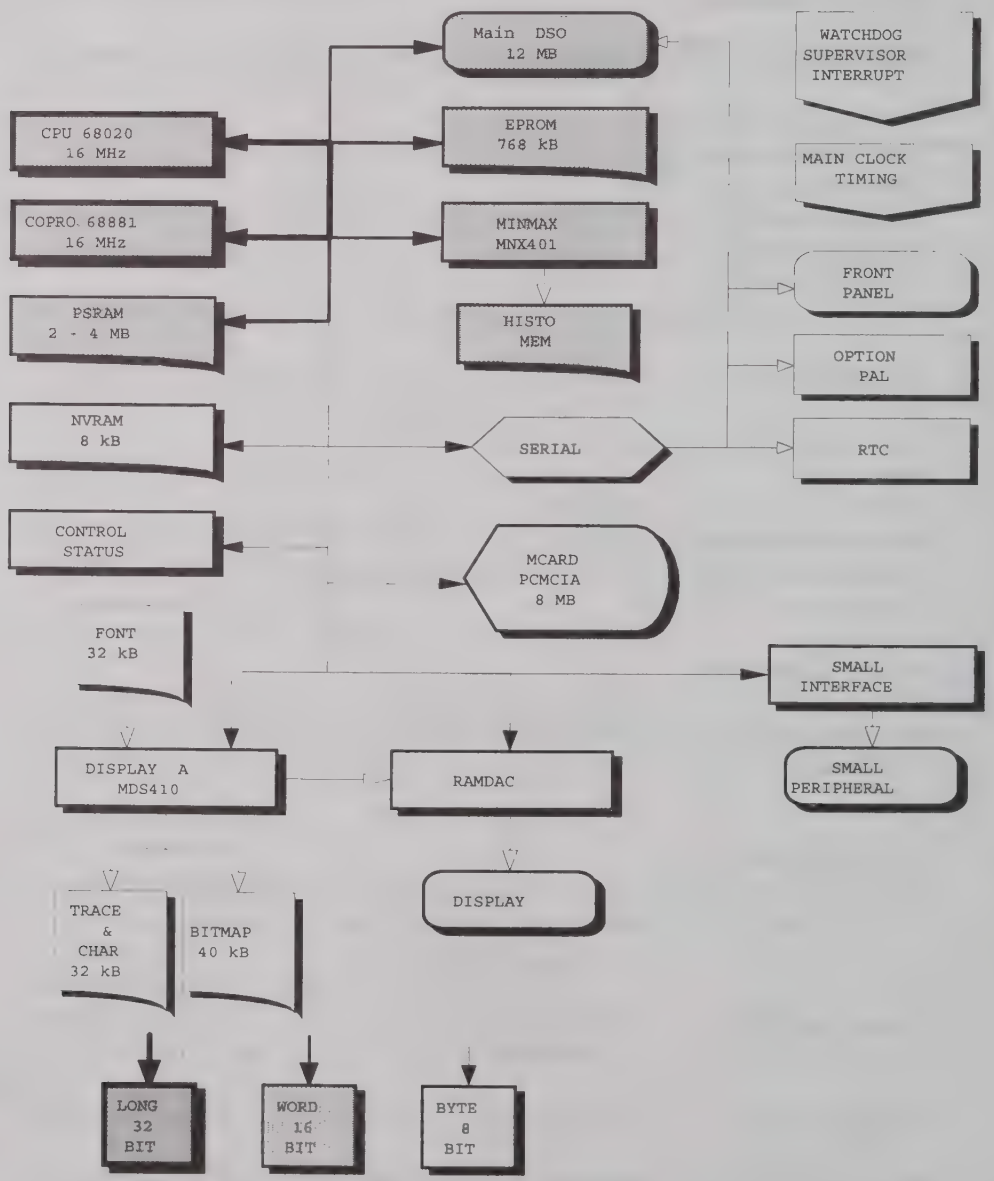
4.1.5 Optional Interfaces

Graphic Printer	: F9300-6 interface and F9300-7 printer controller. Internal graphic printer
Floppy Disk Drive	: F9300-6 interface 1.44 Mbytes floppy
Centronics Printer	: F9300-6 interface
Hard Disk Drive	: F9300-8 PCMCIA III controller, 130 Mbytes hard disk

4.2 Processor Board : F9300-1-2 for 9361

This processor board is based on to the 68020 and 68881 coprocessor, with an internal clock frequency of 16 MHz, and 2 Mbytes RAM memory. The peripheral Data Bus set 8 or 16 bits, the Address Bus has 27 bits (A0-25 & A31).

4.2.1 F9300-1-2 Processor Block Diagram



Program memory (EPROM)

1 Mbytes	: 4 x 2 Mbit Eproms or 2 x 4 Mbit Eproms
Data Bus	: 16 bits.
Address	: 0000 0000 to 000D FFFE.

Working memory (PS RAM)

2 Mbytes memory	: 4 Pseudo static RAM of 4 Mbit.
Data Bus	: 16 Bits.
Address	: 0040 0000 to 004F FFFE or 005F FFFE.

Non volatile memory

A static RAM of 8 Kbytes contains the parameters used at power on to initialize the scope and the stored parameters (panels). This memory is battery backed up.

4.2.2 Parallel Peripherals

F9361-3 main board interface : Data bus 16 bits.

The main board is connected to the processor via a 32 bits address bus.
See section 4.3.

Min/Max calculation : Data bus 16 bits.

A gate array MNX401 makes a histogram in its associated 16 Kbytes memory and remembers the minimum and maximum data values it sees.

Memory card : Data bus 8 bits.

An interface is implemented to support an external memory card, PCMCIA / JEIDA 4, type 68 pins, whose size can range from 16 Kbytes to 4 Mbytes, with the extension to support flash memory and I/O cards.

Graphic processor : Data bus 8 bits.

The graphic processor of the raster scan display is a gate array designated MDS410.

Clock frequency	:	48 Mhz.
Trace and characters memory	:	32 Kbytes (SRAM).
Bitmap memory	:	128 Kbytes (BMRAM).
Character font	:	32 Kbytes (SRAM).

DAC command of the display intensity : Data bus 8 bits.

The control of the display intensity is done by a RAMDAC, up to 8 traces.

Status and command registers : Data bus 8 bits.

Status (read) and command (write) registers of 12 bits address, control the memory card and front panel interface during the boot process or after a RESET.

4.2.3 Serial Peripherals

The processor controls the digital and analog section with a dual serial controller.

DAC's registers (read/write)
Front panel registers (68HC05C4)
RTC registers (68HC68T1)
Probe detection
Software options (GAL)
Front end control
Trigger control (MTR408)

Real time clock

Integrated circuit 68HC68T1 (Motorola or RCA).

Resolution	: 1 sec to 99 years.
Clock frequency	: 32.768 KHz.
Non volatile memory	: 32 Kbytes.
Data & Address bus	: 8 bits.
Interrupt level	: 5.

4.2.4 External Interfaces

Serial RS232 interface and Parallel GPIB interface.

See F9300-4 description, section 4.4.

4.2.5 Optional Interfaces

Graphic Printer	: F9300-6 interface and F9300-7 printer controller.
Floppy Disk Drive	: F9300-6 interface
Centronics Printer	: F9300-6 interface
Hard Disk	: F9300-8 interface

4.3 F9360-3 & F9361-3 Main Board

4.3.1 Introduction

The board is divided into five parts :

1. Microprocessor control.

2. Front-end
2.1 Front-end control and power supplies
2.2 Front-end channel 1 and channel 2 normal input (9360 & 9361)
2.3 Front-end channel 1 and channel 2 direct input (HIBW input for 9360 only)

3. Analog to Digital Converter
3.1 ADC control and power supplies
3.2 ADC Channel 1 and Channel 2 normal (100 Ms/s)
3.3 ADC Channel 1 and Channel 2 fast sampler (5 Gs/s for 9360, or 2.5 Gs/s for 9361)

4. Trigger

5. Time base
5.1 100 MHz clock frequency for normal ADC
5.2 833 MHz clock for fast sampling frequency

4.3.2 9360 High Bandwidth Input

The 9360 has two additional high bandwidth inputs (Channel 1 and Channel 2 HIBW).

Mean features are :

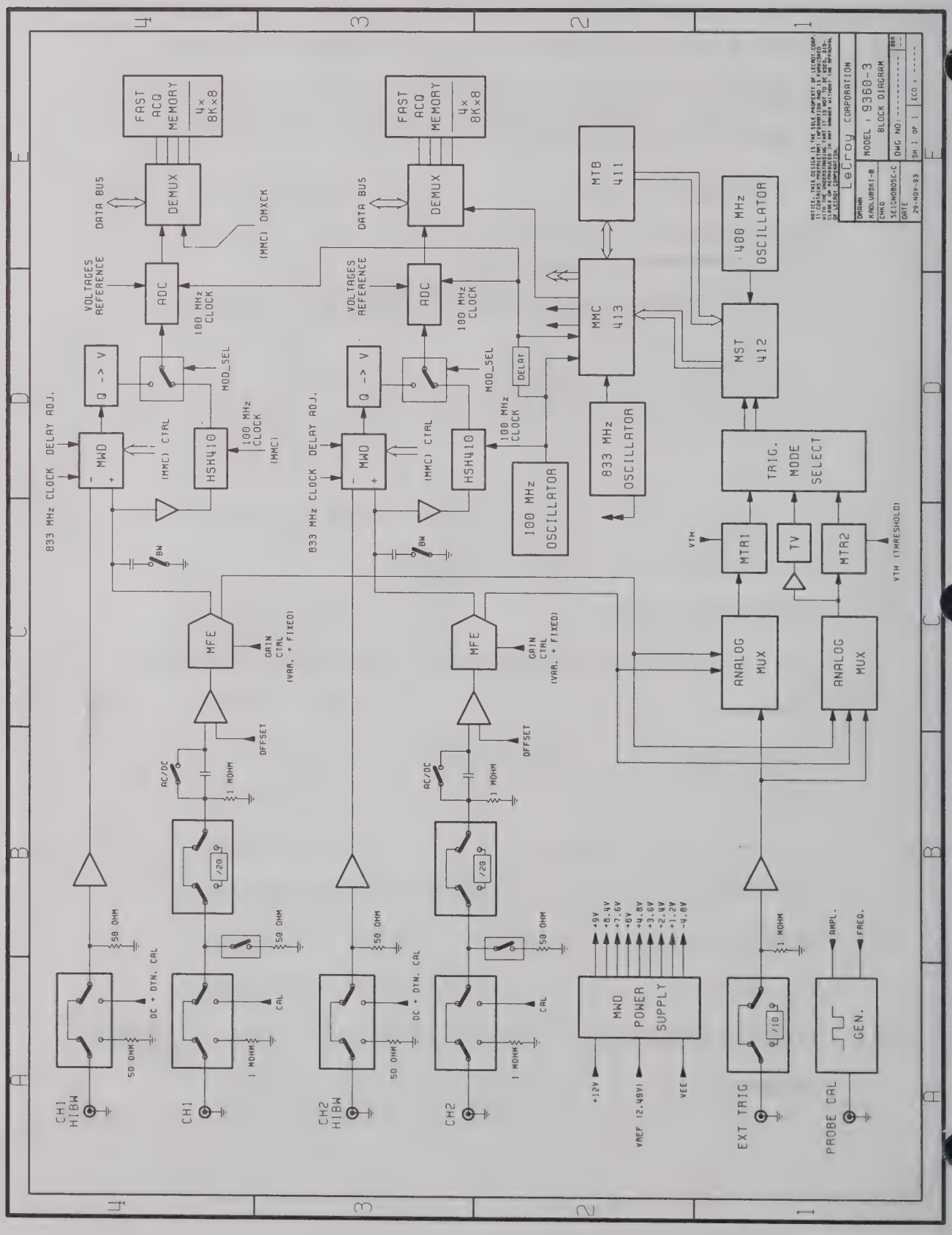
- Input impedance is 50 Ω
- Gain is fixed at 100 mV/div
- Offset range is +/- 4 divisions
- Bandwidth is 600 MHz
- No internal trigger on HIBW input
- No overload protection
- HIBW buffer includes a pulse generator used for MWD dynamic calibration

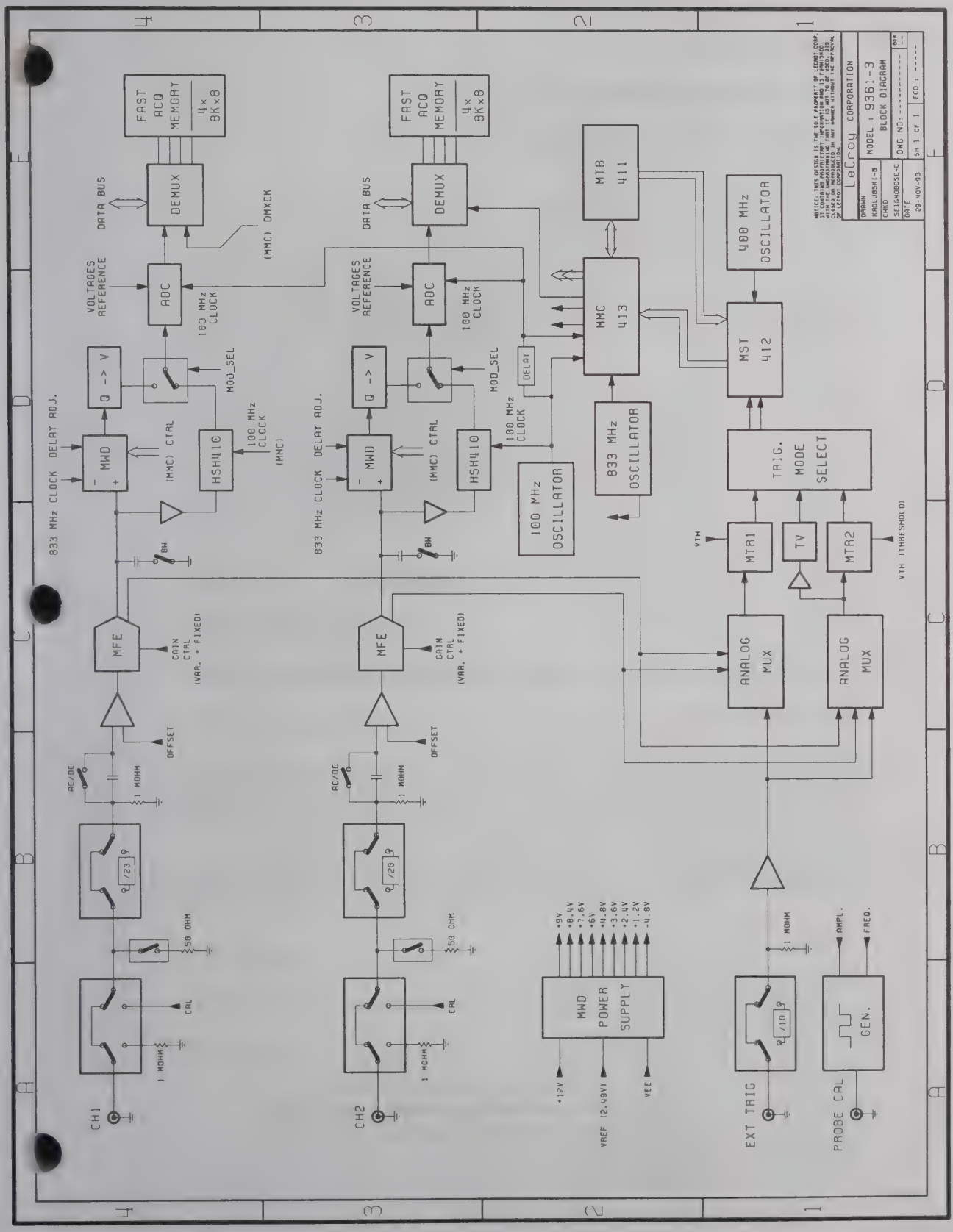
4.3.3 F9360-3 Block Diagram

See page 4-8

4.3.4 F9361-3 Block Diagram

See page 4-9


FAST ACQ MEMORY 4× 8K×8
DEMUX
DATA BUS
(MMC) DMXCK
ADC
VOLTAGES REFERENCE
100 MHz CLOCK
Q -> V
MOD_SEL
MWD
833 MHz CLOCK DELAY ADJ.
(MMC) CTRL
HSH410
100 MHz CLOCK (MMC)
DELAY
BW
MFE
GAIN CTRL (VAR. + FIXED)
OFFSET
AC/OC
1 MOHM
/20
50 OHM
DC + DYN. CAL
CAL
CH1 HIBW
CH1
CH2 HIBW
CH2
100 MHz OSCILLATOR
833 MHz OSCILLATOR
MMC 413
MST 412
MTB 411
400 MHz OSCILLATOR
TRIG. MODE SELECT
MTR1
TV
MTR2
VTH
VTH (THRESHOLD)
ANALOG MUX
MWD POWER SUPPLY
+9V
+8.4V
+7.6V
+6V
+4.8V
+3.6V
+2.4V
+1.2V
-4.8V
+12V
VREF (2.49V)
VEE
/10
EXT TRIG
AMPL.
FREQ.
PROBE CAL
GEN.
Lecroy CORPORATION
MODEL : 9360-3
BLOCK DIAGRAM
DRAWN K.KOLUBSKI-B
CHKD SEIGHOBOSC-C
DATE 29-NOV-93
DWG NO: ----------
SH 1 OF 1
ECO : -----


FAST ACQ MEMORY
4x 8Kx8
DEMUX
DATA BUS
(MMC) DMXCK
VOLTAGES REFERENCE
ADC
100 MHz CLOCK
Q -> V
MOD_SEL
MWD
(MMC) CTRL
HSH410
100 MHz CLOCK (MMC)
833 MHz CLOCK DELAY ADJ.
BW
MFE
GAIN CTRL (VAR. + FIXED)
OFFSET
AC/DC
1 MOHM
/20
50 OHM
CAL
CH1
CH2
MTB 411
MMC 413
MST 412
400 MHz OSCILLATOR
833 MHz OSCILLATOR
100 MHz OSCILLATOR
DELAY
TRIG. MODE SELECT
MTR1
TV
MTR2
VTH
VTH (THRESHOLD)
ANALOG MUX
MWD POWER SUPPLY
+9V
+8.4V
+7.6V
+6V
+4.8V
+3.6V
+2.4V
+1.2V
-4.8V
+12V
VREF (2.49V)
VEE
/10
EXT TRIG
AMPL.
FREQ.
GEN.
PROBE CAL
LeCroy CORPORATION
MODEL : 9361-3
BLOCK DIAGRAM
DRAWN KADLUBSKI-B
CHKD SEIGNOBOSC-C
DATE 29-NOV-93
DWG NO:
SH 1 OF 1
ECO :

4.3.5 Front End Control

4.3.5.1 Front End Serial Commands of Gain and Coupling

Send by the processor in a 16 bits word.

Address :Channel 1 0141 0000
Channel 2 0141 1000

Cal/in	:20/*1	2 mV	5 mV	10 mV	20 mV	50 mV	100 mV

ADC	- ADC	BWL	MTR2	MTR1	Of:10	AC/DC	HZ/50

msb lsb

Cal/in	0 = Cal coupling
:20/*	0 = Attenuator is on
X mV	1 = Range enable
ADC	1 = to invert signal (seven lsb's = LINV)
- ADC	0 = to invert signal (sign, msb = MINV)
BWL	1 = Bandwidth limit on
MTR2	0 = no coupling on MTR2
MTR1	0 = no coupling on MTR1
Of:10	0 = Offset gain for 20 mV to 5 V range (X1)
AC/DC	0 = AC coupling
HZ/50	0 = High Z coupling

4.3.5.2 Front End Serial Commands of Trigger Coupling and Calibration

Address : 0141 4000

MTR2

Cal:10	TBWL2	HFREJ2	AC2	DC2	IMTR2	SNEG2	SPOS2

MTR1

SEXTCK	TBWL1	HFREJ1	AC1	DC1	IMTR1	SNEG1	SPOS1

msb lsb

Cal:10	1 = divide by 4
	0 = divide by 40
TBWL1 & 2	0 = bandwidth limiter on
HFREJ1 & 2	0 = high frequency reject on
AC1 & 2	0 = AC coupling on
DC1 & 2	0 = DC coupling on
SEXTCK	1 = select external clock and disable TDC interpolator
IMTR1	0 = for MTR1 offset calibration or external trigger source
IMTR2	0 = for MTR2 offset calibration or external trigger source
SNEG1 & 2	0 = negative slope
SPOS1 & 2	0 = positive slope

4.3.5.3 Front End Serial Commands of External Trigger and TV Trigger

Address : 0141 5000

TVINV	MTR2	MTR1	TEXT:10	HDTV	875	MB	MA
msb							lsb

_STI	_STW	SVS	STS	TSEL3	TSEL2	TSEL1	TSEL0

TVINV 0 = inverting
MTR2 0 = no coupling on MTR2
MTR1 0 = no coupling on MTR1
TEXT:10 0 = 20 dB attenuator is on
HDTV & 875 = HDTV : 1225, 875, 625, 525
MB & MA = TV1, TV2 : lines
_STI 0 = trigger on interval width mode
_STW 0 = trigger on pulse width mode
SVS 0 = enable TV1 multiplexer
STS 0 = enable TV2 multiplexer
TSEL3 = trigger selection
TSEL2
TSEL1
TSEL0

4.3.6 Analog to Digital Converter

4.3.6.1 Introduction

The analog to digital converter is divided in two parts :

Normal : a traditional sample and hold (HSH410) with flash ADC working at 100 Ms/s

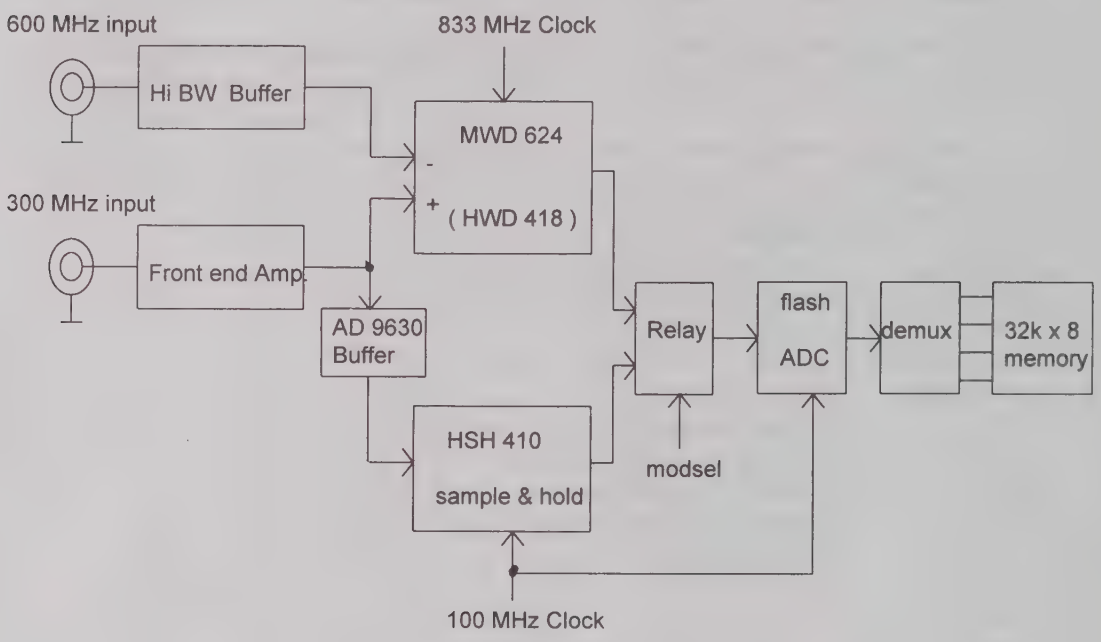
MWD : fast sampler and analog memory circuit (MWD624) used for the following sampling rates : 250 Ms/s, 500 Ms/s, 1 Gs/s, 2.5 Gs/s and for 9360 only : 5 Gs/s. The Monolithic Waveform Digitizer is a 5 Gs/s fast sampler combined with an analog memory of 624 cells. The charges stored in the memory cells are read out at lower speed after the end of the acquisition.

ADC resolution : 8 bits.

ADC input level : 165 mV peak to peak from the nominal 320 mV front-end output.

ADC memory : 32 Kbytes

4.3.6.2 ADC Block Diagram



4.3.7 Time Base

4.3.7.1 Introduction

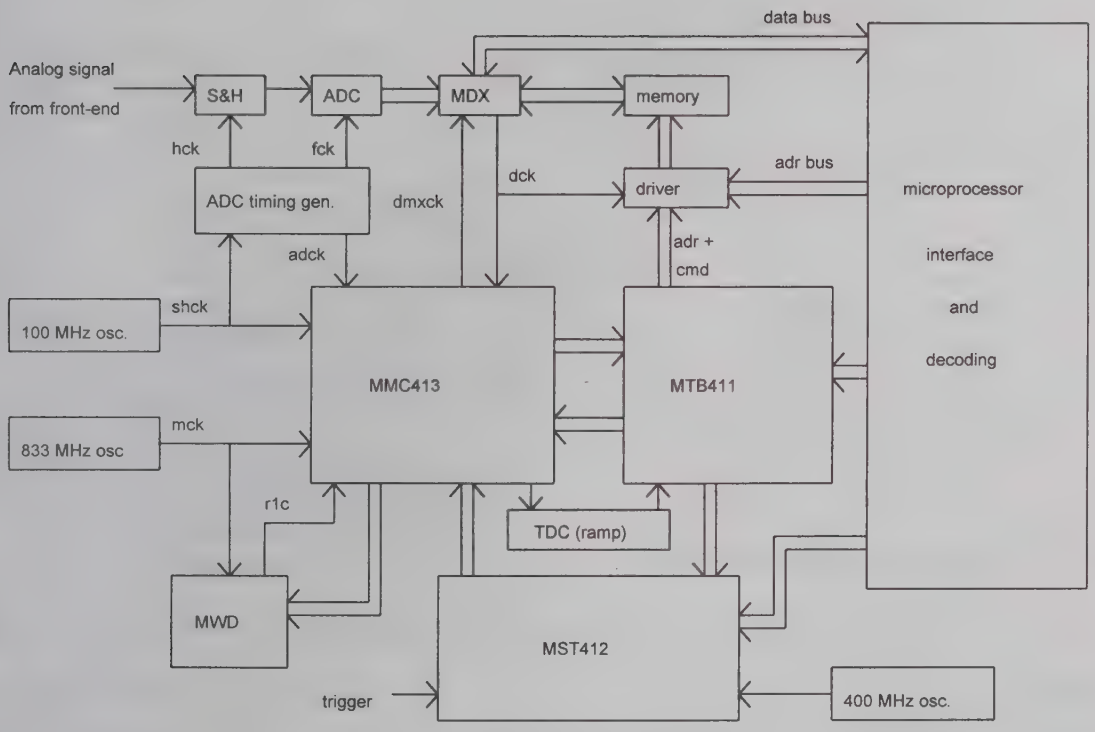
Three independant oscillators are used :

- 100 MHz for normal ADC mode, some general timebase functions as well as in MWD mode, MWD read, conversion and pretrigger delay.

- 833 MHz for MWD write operation

- 400 MHz for smart trigger mode

4.3.7.2 Time Base Block Diagram

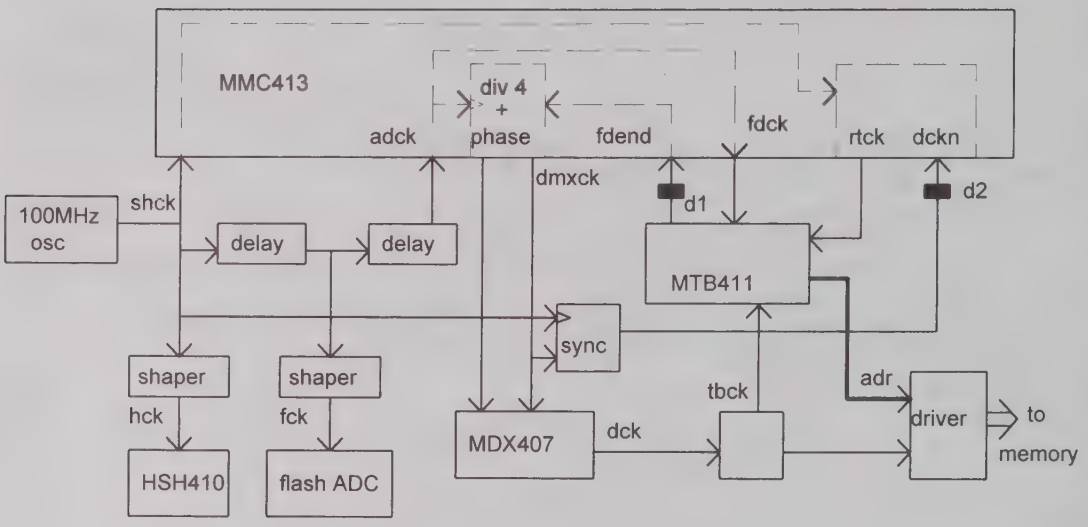


- MTB411 : general time base control, start/stop, counters, memory address.

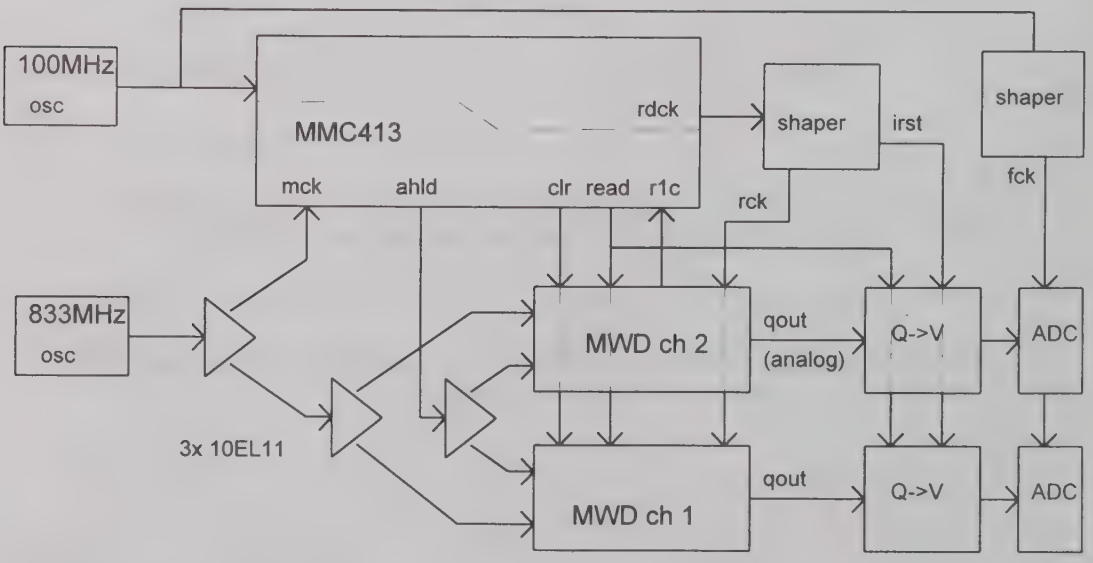
- MST412 : smart trigger (ECL, bipolar).

- MMC413 : MWD acquisition control, timings, TDC synchronisation, clock generation for the demux circuit (ECL, TTL, bipolar).

4.3.7.3 100 MHz Operation Block Diagram



4.3.7.4 833 MHz Operation Block Diagram



4.4 F9300-4 GPIB and RS 232 Interface

This board is connected to the processor through a flat cable.
Data bus is 8 bits, address bus: 12 bits.
Address 0180 000 to 0180 00FF.

4.4.1 RS 232 Serial Interface

Based on the 2661A IC from Signetics or Philips.

- Clock frequency 4.9152 MHz.
- 4 internal registers of 8 bits.
- Interrupt level 2.
- Connector type DB9 with 9 male pins.

4.4.2 GPIB Interface

Based on the circuit 7210 IC from NEC.

- Clock frequency 5 MHz.
- 8 internal registers of 8 bits.
- Tri-state external GPIB drivers. - Low level output.
- Interrupt level 3.

The GPIB address is set by software and stored in non-volatile memory.

4.5 F9350-5 Front Panel

The front panel is connected to the processor board with a flat cable. Power supply and control signals are supplied from the processor. The front panel is divided in two sections:

- One board with Motorola 68HC05C4 processor, coders, and serial data interface.
- One matrix Keyboard with push buttons.

4.6 F9300-6 Centronics, Floppy, Printer interface option

4.6.1 Centronics interface option

This Centronics interface makes direct connection possible to external parallel printer.

- Address 0130 0180 to 0130 01A0
- Interrupt level 2

4.6.2 Floppy Disk drive interface option

Based on the circuit MCS3201 from Motorola.

- Address 0130 01C0 to 0130 01C7
- Interrupt level 4

Address	Read	Write
0130 01C0	Input register	-----
0130 01C2	-----	Digital output register
0130 01C4	Main status register	-----
0130 01C5	Data register	Data register
0130 01C7	Data input register	Disk control register

4.6.3 Printer Interface option

Internal graphic printer : Seiko LPT5446

- Address 0130 0140 to 0130 0160
- Interrupt level 2

4.7 F9300-7 Printer Controller option

Based on the LPT5000 series control chip set from Seiko instrument Inc

- PT501P01 CPU
- PT500GA1 Gate array
- Technical reference 39019-2234-01
- Address 0130 0100

4.8 F9300-8 Hard Disk option, PCMCIA III Controller

- Address 0130 0800 to 0130 0bff
- Interrupt level 5

4.9 93XX-Display

4.9.1 General Description

The raster scan display module is divided into five sections:

- Graphic processor
- Deflection
- Video
- Yoke
- Cathode ray tube

4.9.2 Basic Characteristics

- Nine inches diagonal monochrome, yellowish, orange.
- CRT anti-glare treated
- Non interlaced resolution of (X)810 x (Y)696 pixels at 60 Hz or 50 Hz frequency.

- Landscape vertical raster
- Electromagnetic deflection.
- Intensity control rise and fall time > 12 ns.
- Analog intensity input
- TTL synchronization input.
- Horizontal nominal size: 165 mm for X-on = 15.39 Ms.
- Horizontal size adjustment: > +/- 5 mm.
- Horizontal offset adjustment: +/- 5 mm.
- Vertical nominal size: 120 mm for Y-on = 14.5µs.
- Vertical size adjustment: > +/- 5 mm.
- Vertical offset adjustment: +/- 5 mm.
- X and Y differential non linearity: 10%.

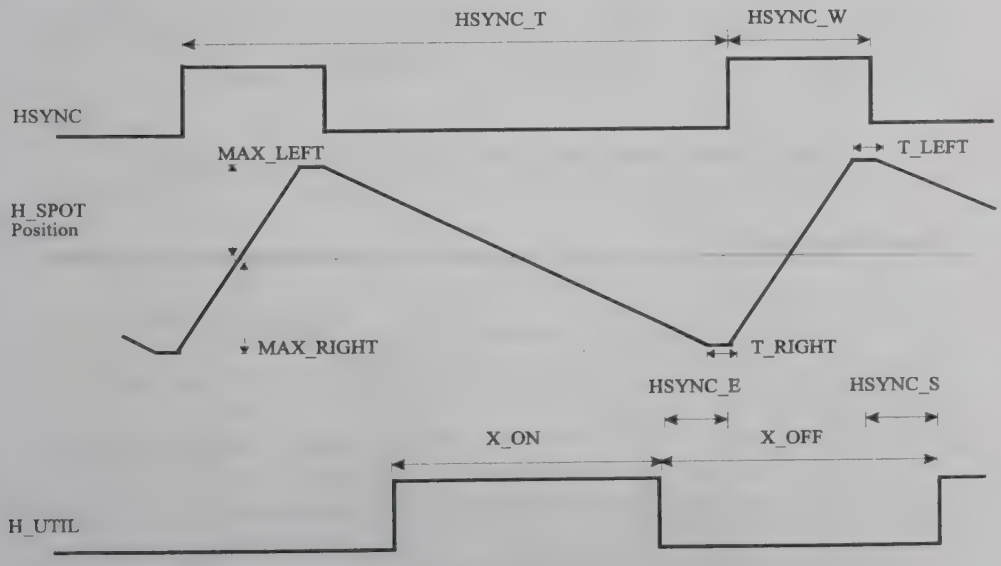
The line deflection is vertical, from bottom to top. The field deflection is horizontal, from left to right and is resynchronized to the power line frequency.

4.9.3 Horizontal Deflection

The horizontal deflection is synchronized to the 50 or 60 Hertz power line frequency. The on time display is the same for both frequencies, therefore the deflection is calculated for 60 Hz. The horizontal deflection is controlled by the HSYNC signal.

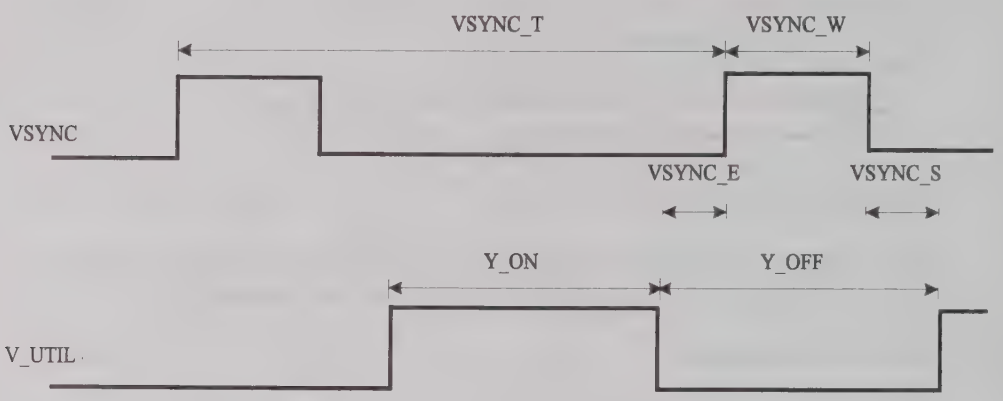
The trailing edge of HSYNC resets the horizontal spot position to a hardware predefined position at the left side of the screen: MAX_left. When ever HSYNC is high, the spot stays at this position.

The falling edge of HSYNC starts the horizontal deflection ramp. The ramp has the same rate for either 50 or 60 Hertz frequency.
When ever HSYNC is low, the horizontal deflection will rise left to right, until HSYNC becomes high, or the system has reached the maximum right position (MAX_RIGHT).



4.9.4 Vertical Synchronization

The timing of both VSYNC and HSYNC is synchronized to the pixel clock (PCLK).



The pixel rate is 48 MHz.

4.9.5 Horizontal Resolution

	# of vertical line	Time in ms
HSYNC_T	842	15.998
HSYNC_W	22	0.418
HSYNC_E	4	0.076
HSYNC_S	6	0.114
X-ON	810	15.390
X-OFF	32	0.608

Values of the horizontal timing for the maximum field refresh frequency.

4.9.6 Vertical Resolution

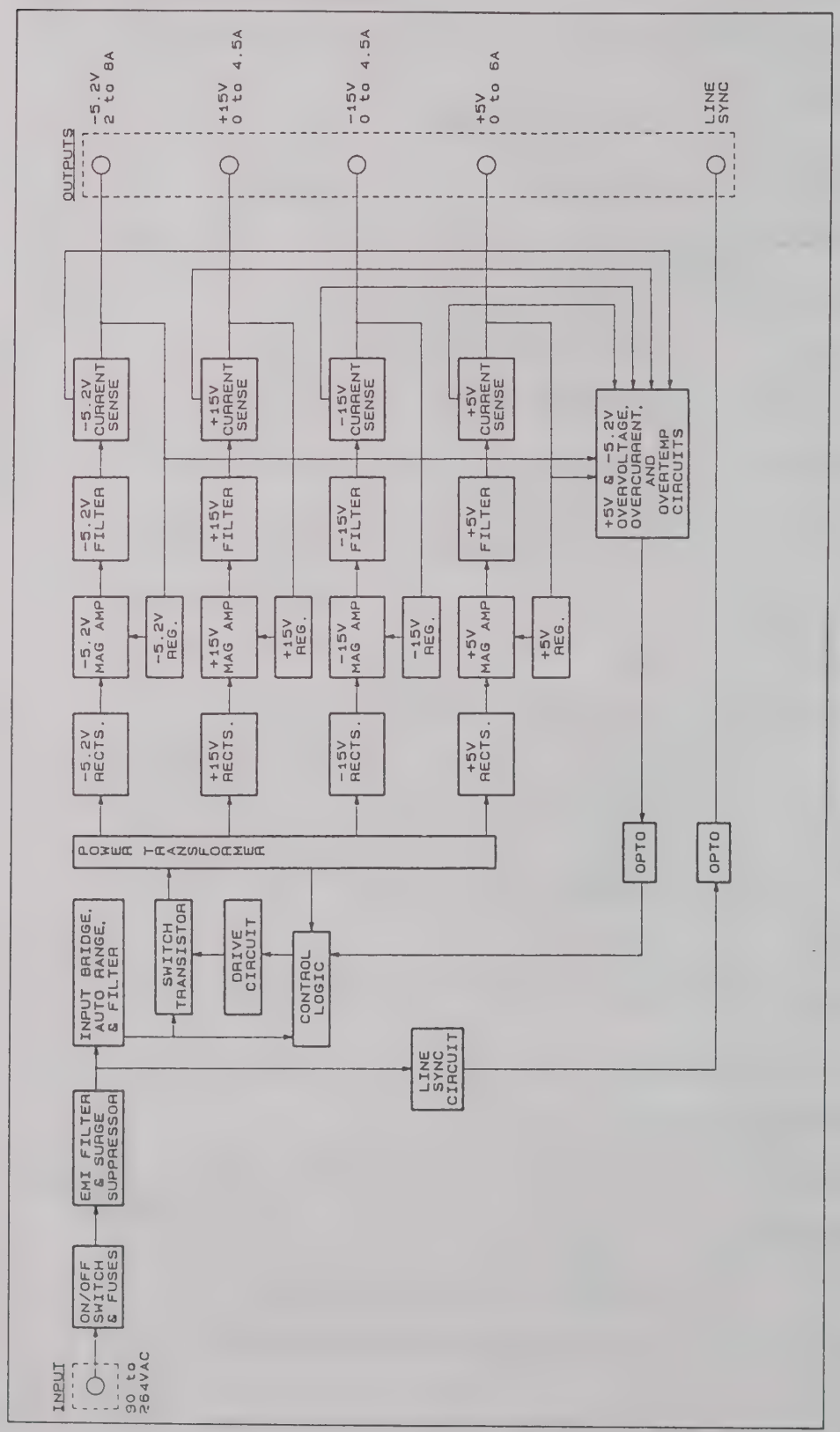
	# of Pixels	Time in µs
VSYNC_T	912	19.000
VSYNC_W	136	2.833
VSYINC_E	0	0.000
VSYNC_S	80	1.666
Y-ON	696	14.500
Y-OFF	216	4.500

4.10 93XX-PS1715 Power Supply

4.10.1 Power Supply Specifications

Input voltage	: 90 to 132 V or 180 to 250 V. Auto ranging line voltage.
Input frequency	: 45 Hz to 66 Hz.
Input rush current	: Max 40 A peak at start up.
Environmental	: Operating temperature range 0 °C to 55 °C Storage temperature range -20 °Cto 85 °C Relative humidity from 5% to 95%.
Shock vibration	: MIL-STD-810D MIL-T-28000C, para 4.5.5.4.2
Output voltages	: - 5.2 Vdc, 8 amp Max. + 5.2 Vdc, 4.5 amp Max. -15.1 Vdc, 4.5 amp Max +15.1 Vdc, 4.5 amp Max.
Output adjustment	: +/- 5%.
Regulation	: +/- 1%.
Transient response	: -5.2 V < 400 mV. +5.2 V < 250 mV. +/- 15.1 V < 1.5 V. Maximum recovery time 1.5 msec.
Ripple and noise	: Peak to peak value < 1%. Line frequency rejection < 5 mV.
Overshoot :	< 5% at start up.
Hold up time	: 20 msec.
Output short circuit protection	: Yes.
Output overvoltage protection	: No.
Input protection	: 5 amp fuses.
Thermal protection	: Yes.
Safety	: VDE 0806, IEC 380, UL478, CSAC22.2#154
EMI	: VDE 0871 class B, FCC 20780 part 15j, class B.

4.10.2 Power Supply Block Diagram



SECTION 5 Performance Verification

5.1 Introduction

This procedure can be used to verify the main operating specifications of the LeCroy 9360 or 9361 digital storage oscilloscope, it is useful as an incoming inspection checkout. It is time consuming and requires extensive test equipment. If you are not familiar with operating the 9360/61 oscilloscope, read the operator's manual.

5.2 Test Equipment Needed

Instrument	Specifications	Recommended	Where used
Signal Generator (sine wave)	Frequency : .5 MHz to 1 GHz Frequency Accuracy : 1 ppm Amplitude : 1 V peak to peak	Marconi 2030 or equivalent	5.9.1.a 5.11 5.12
Leveled Sine wave generator	Frequency : .5 MHz -250 MHz Amplitude : 5 V peak to peak	Tektronix SG503 or equivalent	5.9.1.b
Fast pulse Generator	Rise time < 500 psec	LeCroy 4969 or equivalent	5.13
Sine Wave Generator	Frequency : 5 KHz Amplitude : 6 V peak to peak	LeCroy LW420 or equivalent	5.10
DC precision Power Supply	Amplitude : 10 V, DC Accuracy : < 0.1 %	Tektronix PS5004	5.7, 5.8 5.15
Digital Multimeter	4 digits	Keithley 199 or equivalent	5.4 5.5
Cable	BNC, 50 Ω, length 20 cm, 1ns (7.87 inches)	LeCroy 4802432001	5.10.3 5.10.4
Cable	BNC, 50 Ω, length 100 cm, 5 ns (39.37 inches)	LeCroy 480020101	5.XX
Attenuator	50 Ω, 20 dB 1% accuracy	Suhner	5.7
Attenuator	1 MΩ, 20 dB 1% accuracy	Suhner	5.7
Attenuator	50 Ω, 3 dB 1% accuracy	Suhner	5.10
Terminator	50 Ω Feed through	Suhner	5.13
BNC T adapter	BNC, 50 Ω, T adapter	LeCroy 402222002	5.10.3 5.10.4

Table 5-1 : Test Equipment

5.3 Turn On

- Switch on the power using the power switch on the rear panel and verify :
- The display turns on after about 10 seconds
- The display is stable
- The range of intensity and grid intensity is reasonable

- Wait for about 10 minutes for the scope to reach a stable operating temperature.

5.4 Input Impedance

Specifications

DC 1MΩ ± 1%
DC 50 Ω ± 1%

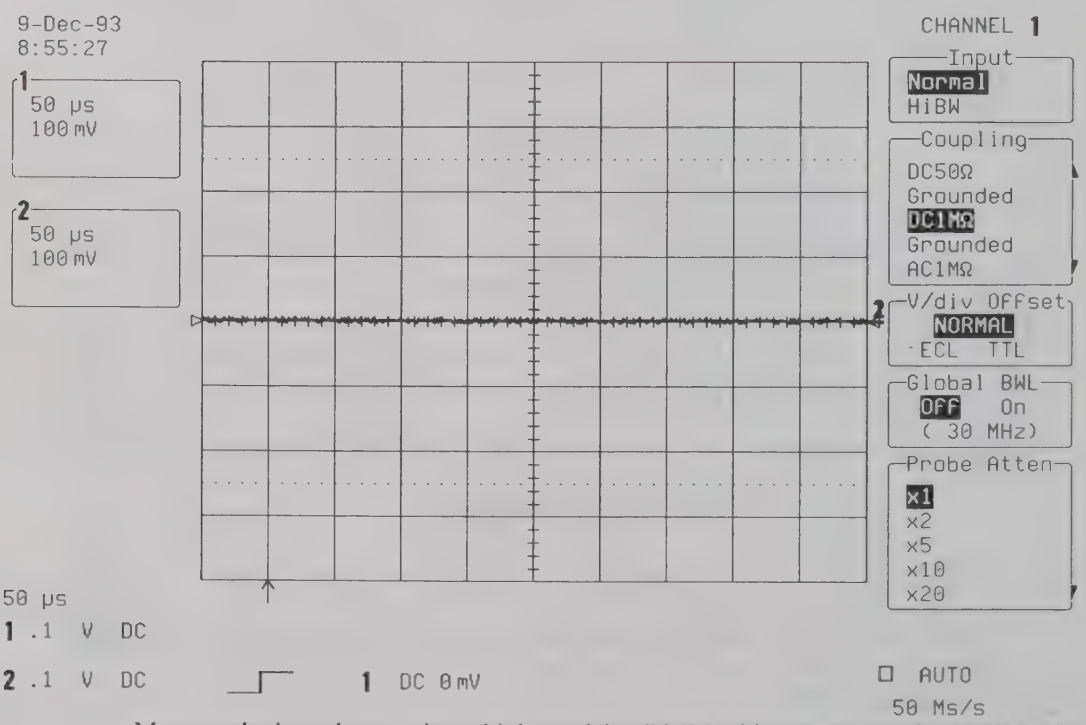
5.4.1 300 MHz Normal Inputs Impedance (9360 and 9361)

Procedure

The input impedance is tested in working conditions, with a high precision digital multimeter.

5.4.1.a DC 1MΩ

- Set DSO Channel 1 : **On**
- Channel 1 Input : **Normal**
- Coupling : **DC 1MΩ**
- Trigger on : **Channel 1**
- Trigger mode : **Auto**
- Input gain : **100 mV/div**
- Time base : **50 µsec/div**

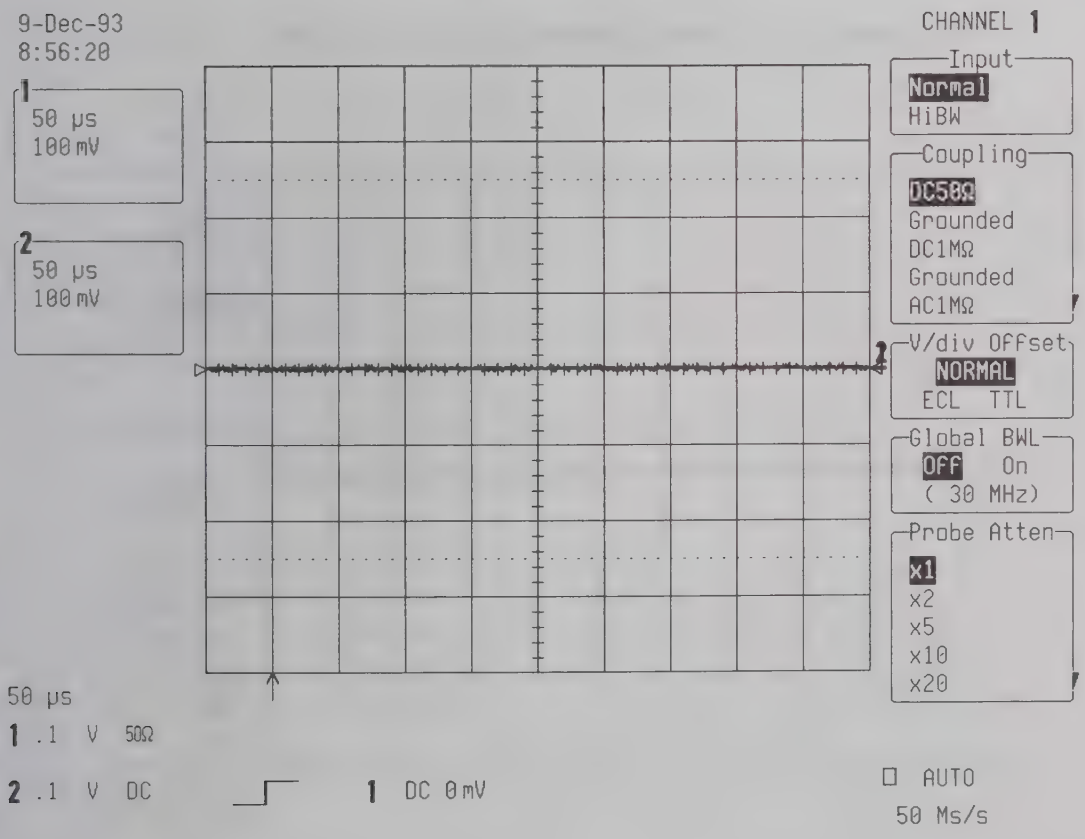


- Measure the impedance using a high precision DMM with sense : must be **1MΩ ± 1%**.

- Repeat the above test for input volt/div. of **200 mV**.

5.4.1.b DC 50Ω

- Channel 1 Input : **Normal**
- Coupling : **DC 50Ω**
- Trigger on : **Channel 1**
- Trigger mode : **Auto**
- Input gain : **100 mV/div**
- Time base : **50 µsec/div**



- Measure the impedance using a high precision DMM with sense : must be **50 Ω ± 1%**
- Repeat steps 5.4.1.a and 5.4.1.b for Channel 2.

5.4.2 600 MHz High Bandwidth Inputs Impedance (9360 only)

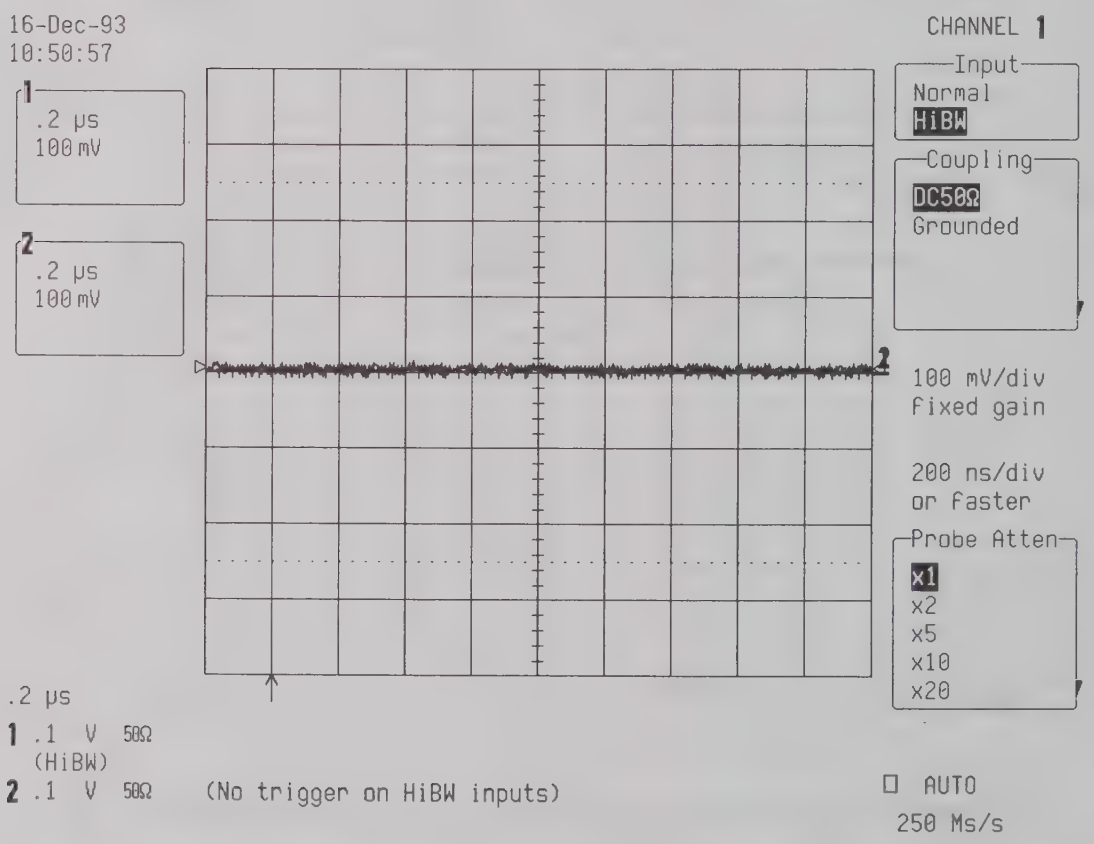
Description

The 9360 high bandwidth inputs impedance is tested at **100 mV/div fixed gain**.

- Set DSO Channel 1 & Channel 2 : **On**

- Time base : **.2µsec**
- Input Channel 1 : **HIBW**
- Coupling Channel 1 : **DC 50Ω**
- Input Channel 2 : **HIBW**
- Coupling Channel 2 : **DC 50Ω**
- Check with a high precision DMM, Channel 1 HIBW input impedance must be **50 Ω ± 1%.**
- If the impedance is infinite, verify .2A fuse **F3000** (see schematics).

- Repeat the test for Ch2. In case of problem verify .2A fuse **F4000**.



5.4.3 External Trigger Input Impedance

With any time base and gain.

- Set Trigger on : **Ext**
- Coupling Ext : **DC**

- Check with a high precision DMM : input impedance must be **1MΩ ± 1%**

- Repeat the test for **Ext/10**, and check as above.

5.4.4 1 MΩ Protective resistor Verification

With any time base and gain, set DSO as follows :

- Input Ch1 : **Normal**
- Coupling : **DC 50 Ω, Grounded**

- The input impedance must be **1 MΩ ± 2%.**

- In case of problem check 1MΩ resistor **R1003**, or troubleshoot relay **RL1000**.

- Repeat the above test for Channel 2.

- In case of problem check 1MΩ resistor **R2003**, or troubleshoot relay **RL2000**.

5.5 Leakage Current

Specifications

DC 1 MΩ, AC 1 MΩ, DC 50 Ω : ± 1 mV

5.5.1 300 MHz Normal Inputs Leakage Current (9360 and 9361)

Procedure

- Set DSO Ch1 : **On**
- Input Channel 1 : **Normal**
- Coupling : **DC 50Ω**
- Input gain : **100 mV/div**
- Time base : **10μsec**

Connect a high precision DMM to Channel 1, and verify that the reading is not larger than ± **1 mV**.

Repeat the test for **1MΩ DC** and **1MΩ AC**.

Repeat step 5.5.1 for Channel 2 and check as above.

5.5.2 600 MHz High Bandwidth Inputs Leakage Current (9360 only)

Set 9360 DSO as follows:

- Time base : **.2μsec**
- Input Channel 1 : **HIBW**
- Coupling : **DC 50Ω**

- Connect a high precision DMM to Channel 1, and verify that the reading is not larger than ± **1 mV**.

- Repeat the test for Channel 2.

5.6 Average Noise Level

5.6.1 300 MHz Normal Inputs Peak to Peak noise and Rms noise (9360 and 9361)

Specifications

< 360 µV RMS at 5 mV/div
< 3.6 mV Peak to Peak at 5 mV/div

Description

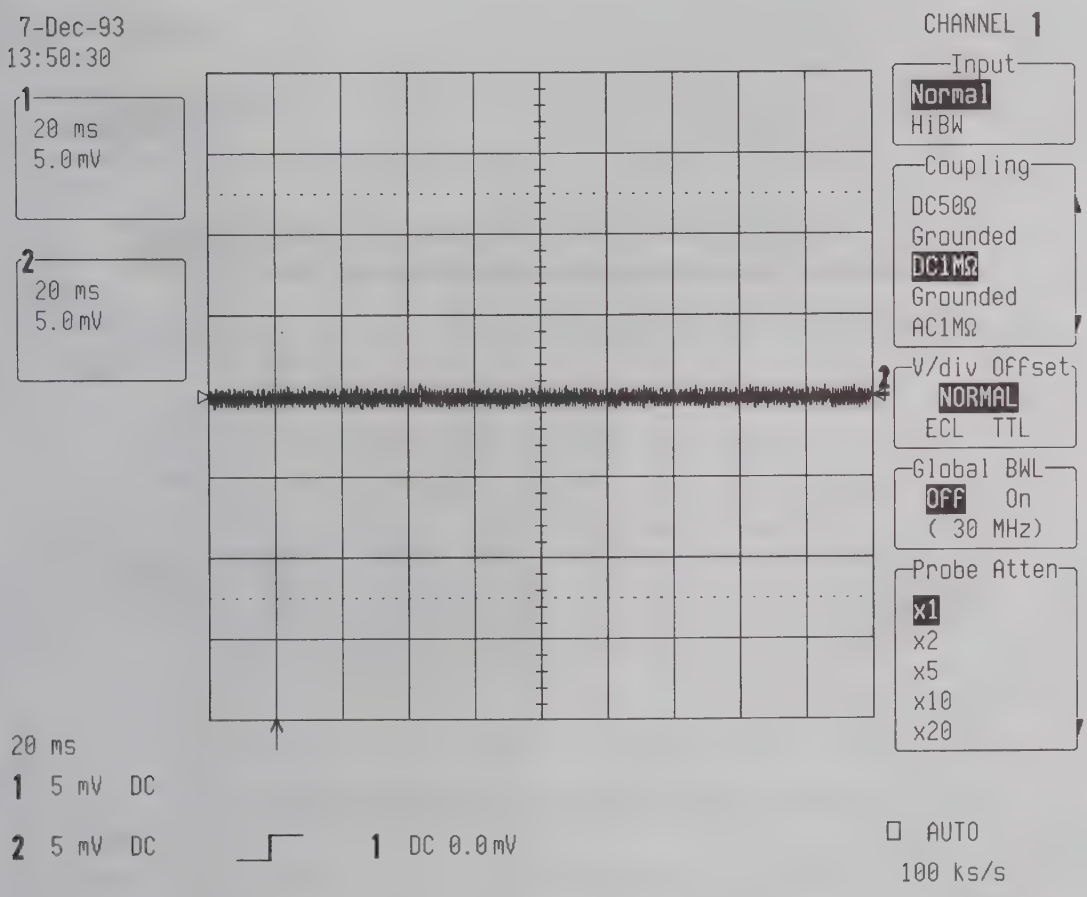
The 9360 or 9361 normal inputs average noise level is tested at 5 mV/div, with 0 mV offset.
This is to verify the proper operation of the main board, front-end and ADC's.
The scope parameters functions are used to measure the RMS and Peak amplitude of the noise.

5.6.1.a DC 1MΩ

Procedure

With no signal connected to the inputs, set 9360 or 9361 DSO settings as follows :

- Turn on traces : **Ch1 and Ch2**
- Display setup : **Standard, Dot Join on, Persistence off, Single grid**
- Ch1and Ch2 Input : **Normal**
- Ch1&Ch2 Coupl : **DC 1MΩ**
- V/div. offset : **Normal**
- Probe atten : **X1**
- Global BWL : **Off**
- Input gain : **5 mV/div**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Holdoff : **Off**
- Trigger Mode : **Auto**
- Timebase : **20 msec/div**.



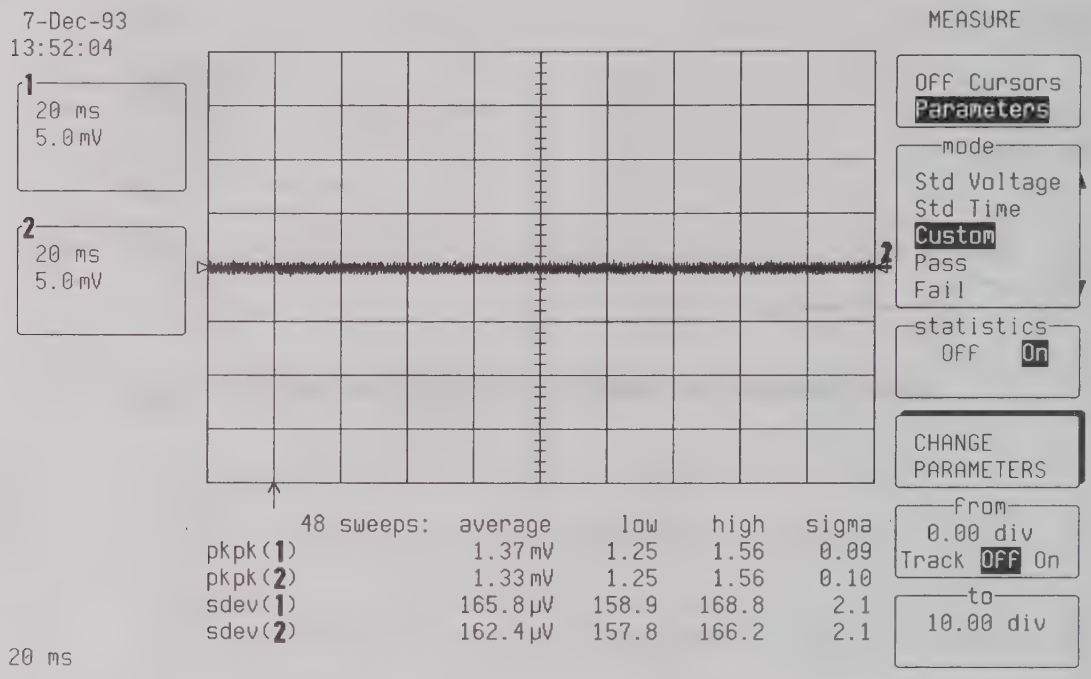
- Press : **Cursors/Measure**
- Measure : **Parameters**
- Mode : **Custom**
- Statistics : **On**

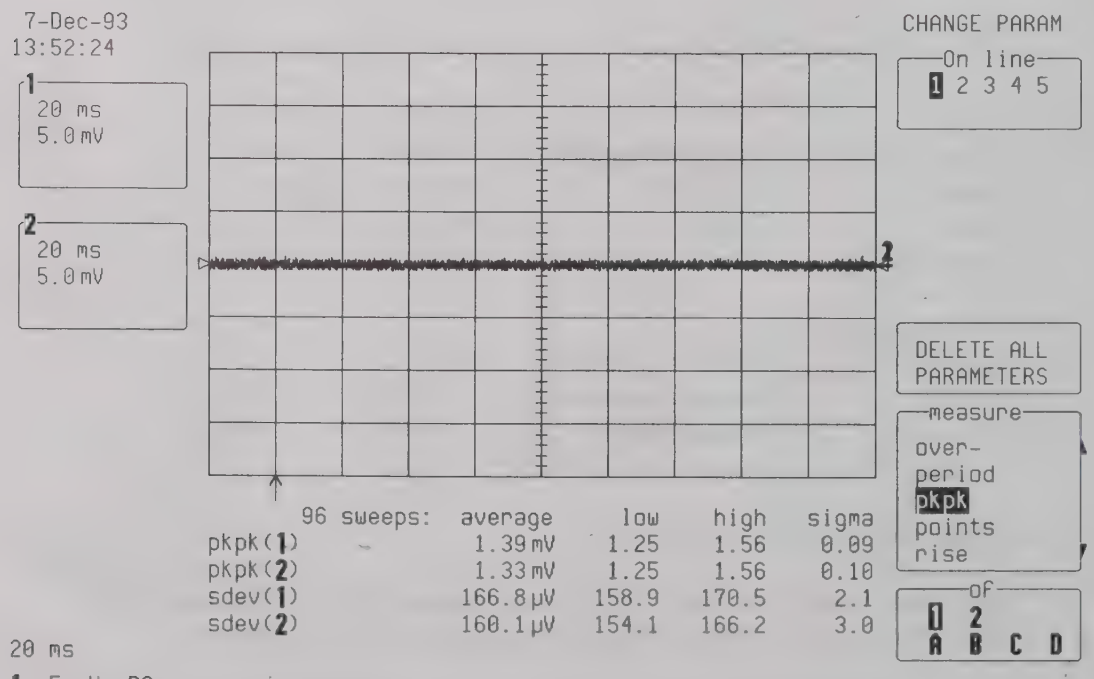
- Change parameters
- On line 1 : **Measure pkpk of Ch1**
- On line 2 : **Measure pkpk of Ch2**
- On line 3 : **Measure sdev of Ch1**
- On line 4 : **Measure sdev of Ch2**

- Check after at least 100 sweeps that :

  high pkpk readout is less than **3.6 mV**, corresponding to **9% of full scale**.
  high sdev readout is less than **360 µV**, corresponding to **0.9% of full scale**.

- Repeat the tests for Timebase : **2 msec/div**, **.2 msec/div**, **20 µsec/div** and **10 µsec/div** and check as above.


7-Dec-93
13:52:04
1
20 ms
5.0 mV
2
20 ms
5.0 mV
MEASURE
Off Cursors
Parameters
mode
Std Voltage
Std Time
Custom
Pass
Fail
statistics
Off On
CHANGE
PARAMETERS
from
0.00 div
Track Off On
to
10.00 div
48 sweeps: average low high sigma
pkpk(1) 1.37 mV 1.25 1.56 0.09
pkpk(2) 1.33 mV 1.25 1.56 0.10
sdev(1) 165.8 µV 158.9 168.8 2.1
sdev(2) 162.4 µV 157.8 166.2 2.1
20 ms
1 5 mV DC
2 5 mV DC
1 DC 0.0 mV
AUTO
100 ks/s

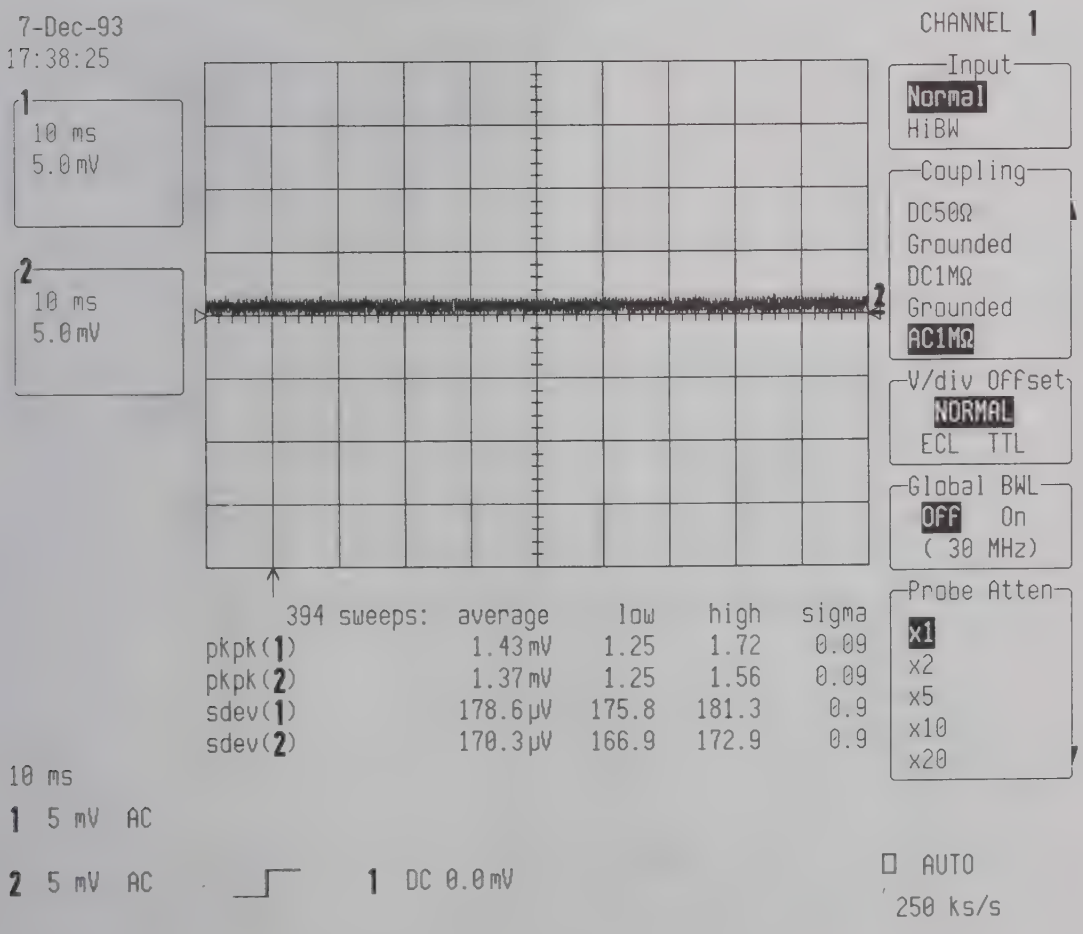

7-Dec-93
13:52:24
1
20 ms
5.0 mV
2
20 ms
5.0 mV
CHANGE PARAM
On line
1 2 3 4 5
DELETE ALL
PARAMETERS
measure
over-
period
pkpk
points
rise
of
1 2
A B C D
96 sweeps: average low high sigma
pkpk(1) 1.39 mV 1.25 1.56 0.09
pkpk(2) 1.33 mV 1.25 1.56 0.10
sdev(1) 166.8 µV 158.9 170.5 2.1
sdev(2) 160.1 µV 154.1 166.2 3.0
20 ms
1 5 mV DC
2 5 mV DC
1 DC 0.0 mV
AUTO
100 ks/s

5.6.1.b AC 1MΩ

- Select Coupling : **Ch1 and Ch2 AC 1MΩ**
- Check after at least 100 sweeps that :

  high pkpk readout is less than **3.6 mV**, corresponding to **9% of full scale**,
  high sdev readout is less than **360 µV**, corresponding to **0.9% of full scale.**

- Repeat the tests for Timebase : **2 msec/div**, **.2 msec/div**, **20 µsec/div** and **10 µsec/div** and check as above.

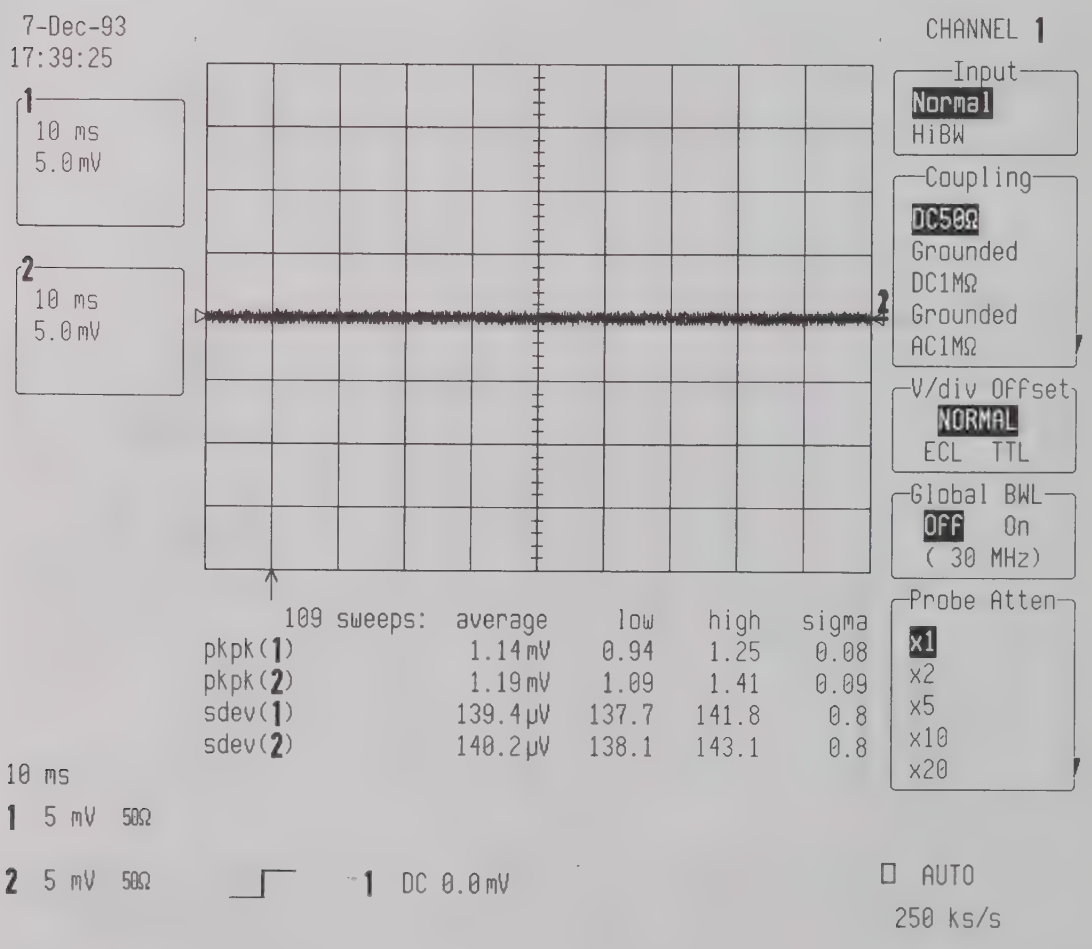


5.6.1.c DC 50Ω

- Select Coupling : **Ch1 and Ch2 DC 50Ω**
- Check after at least 100 sweeps that

  high pkpk readout is less than **3.6 mV**, corresponding to **9% of full scale**,
  high sdev readout is less than **360 µV**, corresponding to **0.9% of the full scale**.

- Repeat the tests for Timebase : **2 msec/div**, **.2 msec/div**, **20 µsec/div** and **10 µsec/div** and check as above.



5.6.2 600 MHz High Bandwidth Inputs Average Noise Level (9360 only)

Specifications

< 7.2mV RMS at 100 mV/div
< 72 mV Peak to peak at 100 mV/div

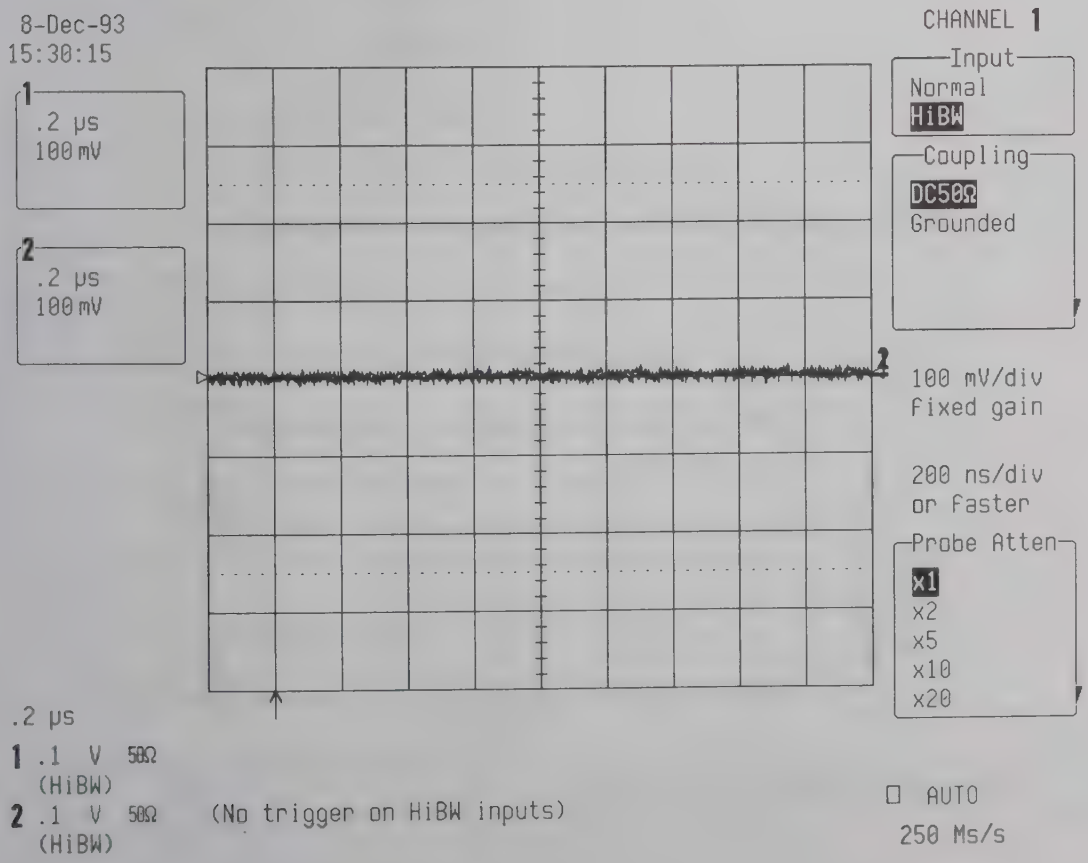
Description

The 9360 high bandwidth inputs average noise level is tested at **100 mV/div fixed gain**, with 0 mV offset.

Procedure

- With no signal connected to the inputs, set 9360 as follows :

- Timebase : **.2 µsec/div**
- Turn on traces : **Ch1 and Ch2**
- Ch1and Ch2 Input : **HIBW**
- Ch1&Ch2 Coupl : **DC 50Ω**
- Probe atten : **X1**



- Press : **Cursors/Measure**
- Measure : **Parameters**
- Mode : **Custom**
- Statistics : **On**

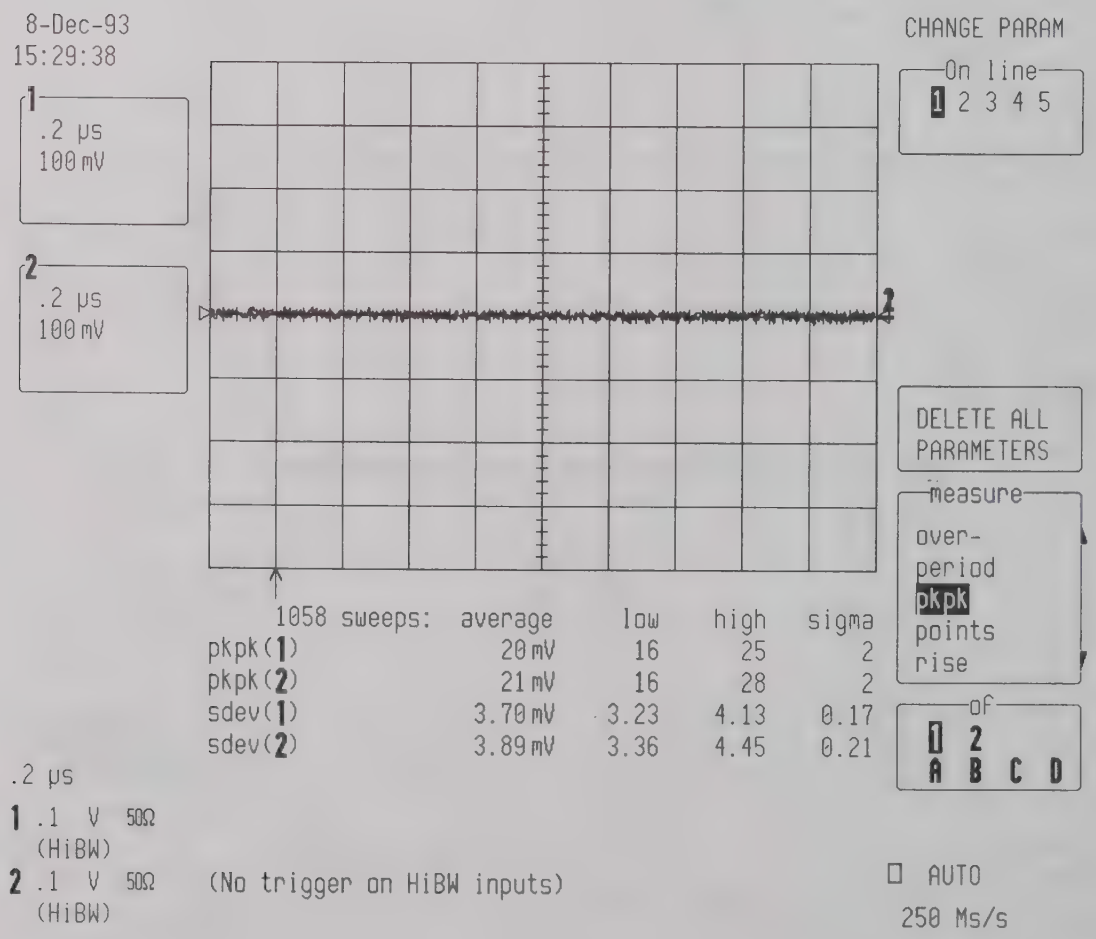
- Change parameters

- On line 1 : **Measure pkpk of Ch1**
- On line 2 : **Measure pkpk of Ch2**
- On line 3 : **Measure sdev of Ch1**
- On line 4 : **Measure sdev of Ch2**

- Check after at least 100 sweeps that :

high pkpk readout is less than **72 mV**, corresponding to **9% of full scale**.

high sdev readout is less than **7.2 mV**, corresponding to **0.9% of full scale**.



5.6.3 Inputs Grounded

5.6.3.1 300 MHz Normal Inputs Grounded (9360 and 9361)

- With no cable plugged into scope, set the DSO as follows :

- Turn on trace : **Channel 1**
- Input : **Normal**
- Coupling : **DC 50Ω**
- Input gain : **10 mV/div**
- Offset : **Zero**
- Timebase : **50 μsec/div**

- Turn on trace : **A**
- Select Math Setup
- For Math : **Use at most 5000 points**
- Redefine A
- Use Math ? : **Yes**
- Math Type : **Average**
- Avg Type : **Summed**
- Of : **Channel 1**

- Turn off trace : **Channel 1**

- Cursors/Measure : **Parameters**
- Mode : **Std Voltage**
- Statistics : **on**
- on displayed trace : **A**

- After at least 100 sweeps readout the **mean (A) : Average**.

- Switch between coupling **DC 50Ω** and **Grounded.**

- Check that the **mean (A)** is not changing by more than **800 μV**.

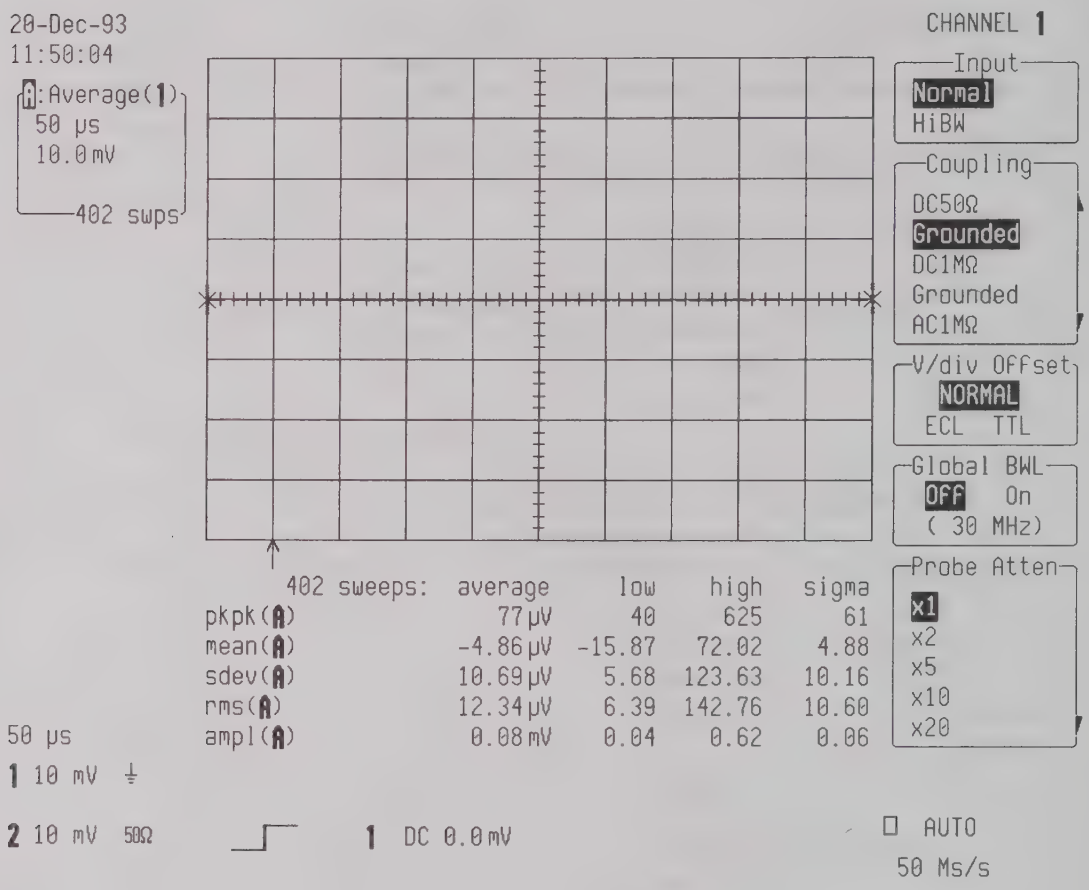
- Set coupling : **DC 1MΩ**

- After at least 100 sweeps readout the **mean (A) : Average**.

- Switch between coupling **DC 1MΩ** and **Grounded**.

- Check that the **mean(A)** is not changing by more than **800 μV**.

- Repeat the test for Channel 2.



5.6.3.2 600 MHz High Bandwidth Inputs Grounded (9360 only)

- With no signal plugged into scope, set 9360 as follows :

- Time base : **.2 µsec**
- Input : **HIBW**
- Coupling : **DC 50Ω**

- After at least 100 sweeps readout the **mean(A) : Average**.

- Switch between coupling **DC 50Ω** and **Grounded**.

- Check that the **mean(A)** is not changing by more than **24 mV**, corresponding to 3% of full scale.

- Repeat the test for Channel 2.

5.7 DC Linearity

Specification

≤ ± 3 % of full scale at 0 mV offset

Description

This test measures the DC Accuracy within the gain range specified.
The parameters Std voltage are used to measure the amplitude of the DC input signal.

In the absence of the computer automated calibration system based on LeCroy Calibration Software (LeCalsoft) for the 9360 and 9361 model oscilloscope, the manual performance test procedure can be followed to establish a traceable calibration, provided that the measurement instruments used are themselves traceable.
For such calibration, follow the manual linearity test procedure using a calibrated and certified high precision (better than 0.1 %) voltage source, for example TEK PS5004 or equivalent, or use a certified DMM to measure the applied voltage.

5.7.1 300 MHz Normal Inputs Linearity (9360 and 9361)

5.7.1.a DC 50Ω

Procedure

- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Channel 1 : **Normal**
- Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input offset : **0.0 mV**
- Input gain : **from 2mV/div to 5 V/div (see table 5-2 and 5-3)**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Auto**
- Holdoff : **Off**
- Timebase : **2 msec/div.**
- Turn on trace : **A**
- Select Math Setup
- For Math : **Use at most 5000 points**
- Redefine A
- Use Math ? : **Yes**
- Math Type : **Average**

- Avg Type : **Summed**
- Of : **Channel 1**
- Turn off trace : **Channel 1**

- Cursors/Measure : **Parameters**
- Mode : **Std Voltage**
- Statistics : **On**
- on displayed trace : **A**

5.7.1.a.1 Positive DC Linearity

- For the ranges **2 mV/div to 1 V/div**, from the high precision voltage source, apply to Channel 1 : **+ 3 major screen divisions**.

- For the low sensitivities : **2 mV, 5 mV, 10 mV, 20 mV** and **50 mV/div**, use a **50 Ohm 20 dB** attenuator.

- For the range **2V/div** and **5V/div**, the maximum input voltage is **+ 5 V**.

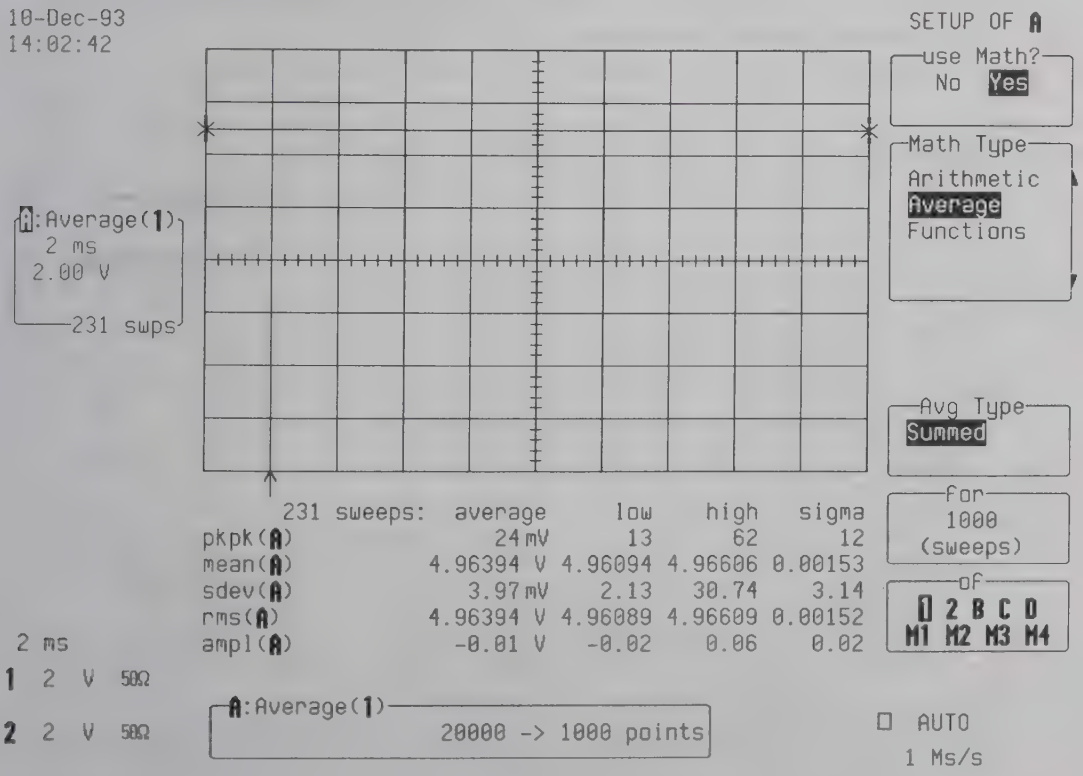
Range	**Attenuator**	**Conditions of Test**			**Average Mean Parameter Reading**		
Volts/div Control	20 dB	PS Output	9360/61 Input	9360/61 Full scale	Min Value -X % of FS	Max Value +X% of FS	X%
2 mV	Yes	+ 60 mV	+ 6 mV	16 mV	+ 5.2 mV	+ 6.8 mV	5%
5 mV	Yes	+ 150 mV	+ 15 mV	40 mV	+ 13.8 mV	+ 16.2 mV	3%
10 mV	Yes	+ 300 mV	+ 30 mV	80 mV	+ 27.6 mv	+ 32.4 mV	3%
20 mV	Yes	+ 600 mV	+ 60 mV	160 mV	+ 55.2 mV	+ 64.8 mV	3%
50 mV	Yes	+ 1.5 V	+150 mV	400 mV	+ 138 mV	+ 162 mV	3%
.1 V	No	+ 300 mV	+ 300 mV	800 mV	+ 276 mV	+ 324 mV	3%
.2 V	No	+ 600 mV	+ 600 mV	1.6 v	+ 552 mV	+ 648 mV	3%
.5 V	No	+ 1.5 V	+ 1.5 V	4 V	+ 1.38 V	+ 1.62 V	3%
1 V	No	+ 3 V	+ 3 V	8 V	+ 2.76 V	+ 3.24 V	3%
2 V	No	Max +5 V	Max +5 V	16 V	+ 4.52 V	+ 5.48 V	3%
5 V	No	Max +5 V	Max +5 V	40 V	+ 3.8 V	+ 6.2 V	3%

Table 5-2 : Positive DC Linearity Readout Accuracy

- For each point, read off the average " **Mean** " parameter voltage, and compare it to the digital readout of the voltage reference.

- The **Mean** parameter reading should be within the limits shown in table 5-2.

10-Dec-93
13:58:03
CHANNEL 1
Input
Normal
HiBW
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
OFF On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
A:Average(1)
2 ms
2.00 mV
155 swps
155 sweeps: average low high sigma
pkpk(A) 0.151 mV 0.074 1.250 0.130
mean(A) 5.95054 mV 5.94629 5.96411 0.00144
sdev(A) 23.14 µV 12.17 154.51 18.24
rms(A) 5.95062 mV 5.94699 5.96407 0.00142
ampl(A) 0.15 mV 0.07 1.25 0.13
2 ms
1 2 mV 50Ω
2 2 mV 50Ω
1 DC 0.00 mV
AUTO
1 Ms/s


10-Dec-93
14:02:42
SETUP OF A
use Math?
No Yes
Math Type
Arithmetic
Average
Functions
A:Average(1)
2 ms
2.00 V
231 swps
Avg Type
Summed
for
1000
(sweeps)
of
1 2 B C D
M1 M2 M3 M4
231 sweeps: average low high sigma
pkpk(A) 24 mV 13 62 12
mean(A) 4.96394 V 4.96094 4.96606 0.00153
sdev(A) 3.97 mV 2.13 30.74 3.14
rms(A) 4.96394 V 4.96089 4.96609 0.00152
ampl(A) -0.01 V -0.02 0.06 0.02
2 ms
1 2 V 50Ω
2 2 V 50Ω
A:Average(1)
20000 -> 1000 points
AUTO
1 Ms/s

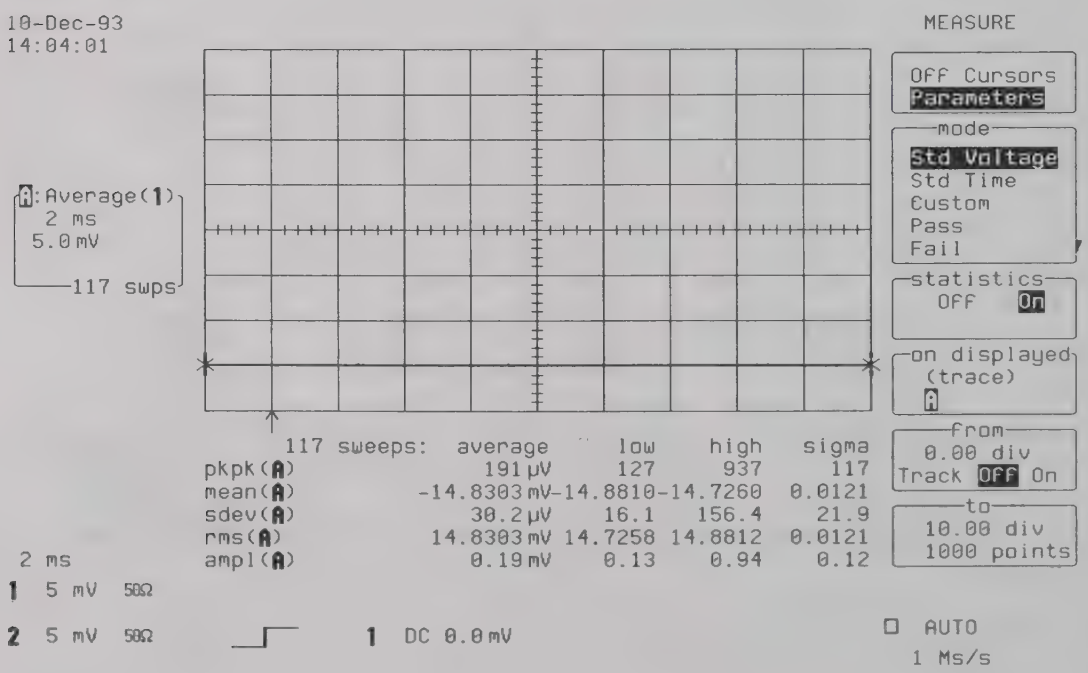
5.7.1.a.2 Negative DC Linearity

- For the ranges **2 mV/div to 1 V/div**, from the high precision voltage source, apply to Channel 1 : **- 3 major screen divisions**.
- For the low sensitivities : **2 mV, 5 mV, 10 mV, 20 mV** and **50 mV/div**, use a **50Ω 20 dB** attenuator.The minimum input voltage is **- 5 V**.

Range	Attenuator	Conditions of Test			Average Mean Reading		
Volts/div Control	20 dB	PS Output	9360/61 Input	9360/61 Full scale	Min Value -X % of FS	Max Value +X% of FS	X%
2 mV	Yes	- 60 mV	- 6 mV	16 mV	- 5.2 mV	- 6.8 mV	5%
5 mV	Yes	- 150 mV	- 15 mV	40 mV	- 13.8 mV	- 16.2 mV	3%
10 mV	Yes	- 300 mV	- 30 mV	80 mV	- 27.6 mV	- 32.4 mV	3%
20 mV	Yes	- 600 mV	- 60 mV	160 mV	- 55.2 mV	- 64.8 mV	3%
50 mV	Yes	- 1.5 V	-150 mV	400 mV	- 138 mV	- 162 mV	3%
.1 V	No	- 300 mV	- 300 mV	800 mV	- 276 mV	- 324 mV	3%
.2 V	No	- 600 mV	- 600 mV	1.6 v	- 552mV	- 648 mV	3%
.5 V	No	- 1.5 V	- 1.5 V	4 V	- 1.38 V	- 1.62 V	3%
1 V	No	- 3 V	- 3 V	8 V	- 2.76 V	- 3.24 V	3%
2 V	No	Max -5 V	Max -5 V	16 V	- 4.52 V	- 5.48 V	3%
5 V	No	Max -5 V	Max -5 V	40 V	- 3.8 V	- 6.2 V	3%

Table 5-3 : Negative DC Linearity Readout Accuracy

- For each point, read off the average " **Mean** " parameter voltage, and compare it to the digital readout of the voltage reference.
- The **Mean** parameter reading should be within the limits shown in table 5-3.



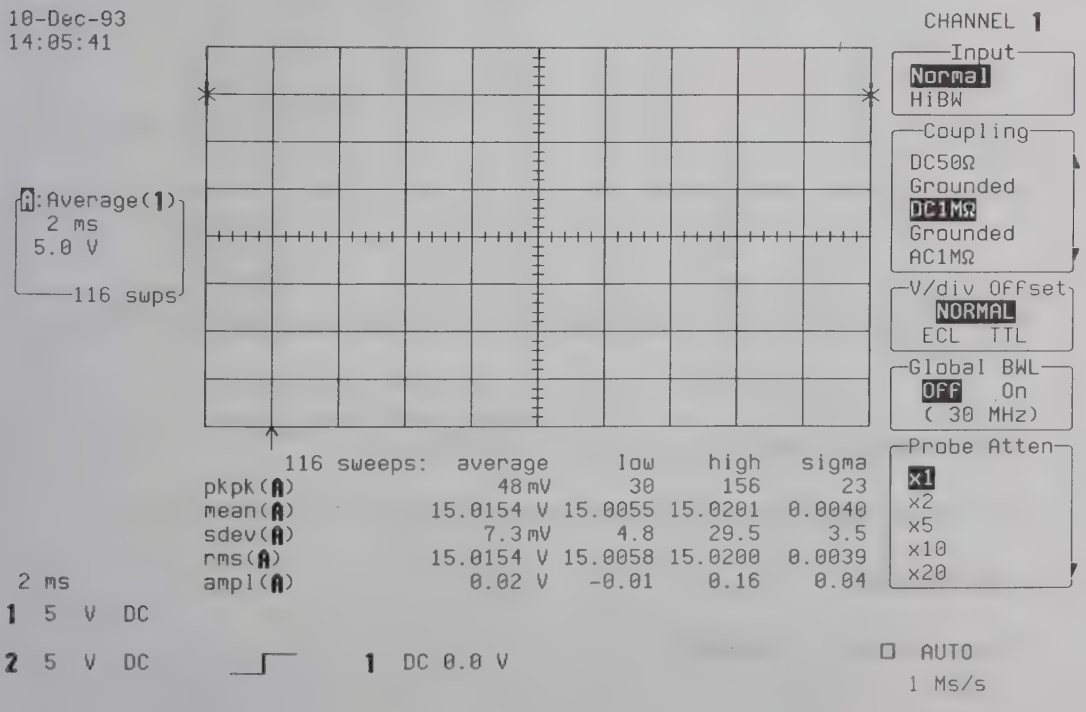
5.7.1.b DC 1MΩ

Set the DSO as follows :

- Input Channel 1 : **Normal**
- Coupling : **DC 1MΩ**
- Input offset : **0.0 mV**
- Input gain : **from 2mV/div to 5 V/div**

Range	Attenuator	Conditions of Test			Average Mean Parameter Reading		
Volts/div Control	20 dB	PS Output	9360/61 Input	9360/61 Full scale	Min Value ±X % of FS	Max Value ±X% of FS	X%
2 mV	Yes	± 60 mV	± 6 mV	16 mV	± 5.2 mV	± 6.8 mV	5%
5 mV	Yes	± 150 mV	± 15 mV	40 mV	± 13.8 mV	± 16.2 mV	3%
10 mV	Yes	± 300 mV	± 30 mV	80 mV	± 27.6 mV	± 32.4 mV	3%
20 mV	Yes	± 600 mV	± 60 mV	160 mV	± 55.2 mV	± 64.8 mV	3%
50 mV	Yes	± 1.5 V	±150 mV	400 mV	± 138 mV	± 162 mV	3%
.1 V	No	± 300 mV	± 300 mV	800 mV	± 276 mV	± 324 mV	3%
.2 V	No	± 600 mV	± 600 mV	1.6 v	± 552mV	± 648 mV	3%
.5 V	No	± 1.5 V	± 1.5 V	4 V	± 1.38 V	± 1.62 V	3%
1 V	No	± 3 V	± 3 V	8 V	± 2.76 V	± 3.24 V	3%
2 V	No	± 6 V	± 6 V	16 V	± 5.52 V	± 6.48 V	3%
5 V	No	± 15 V	± 15 V	40 V	± 13.8 V	± 16.2 V	3%

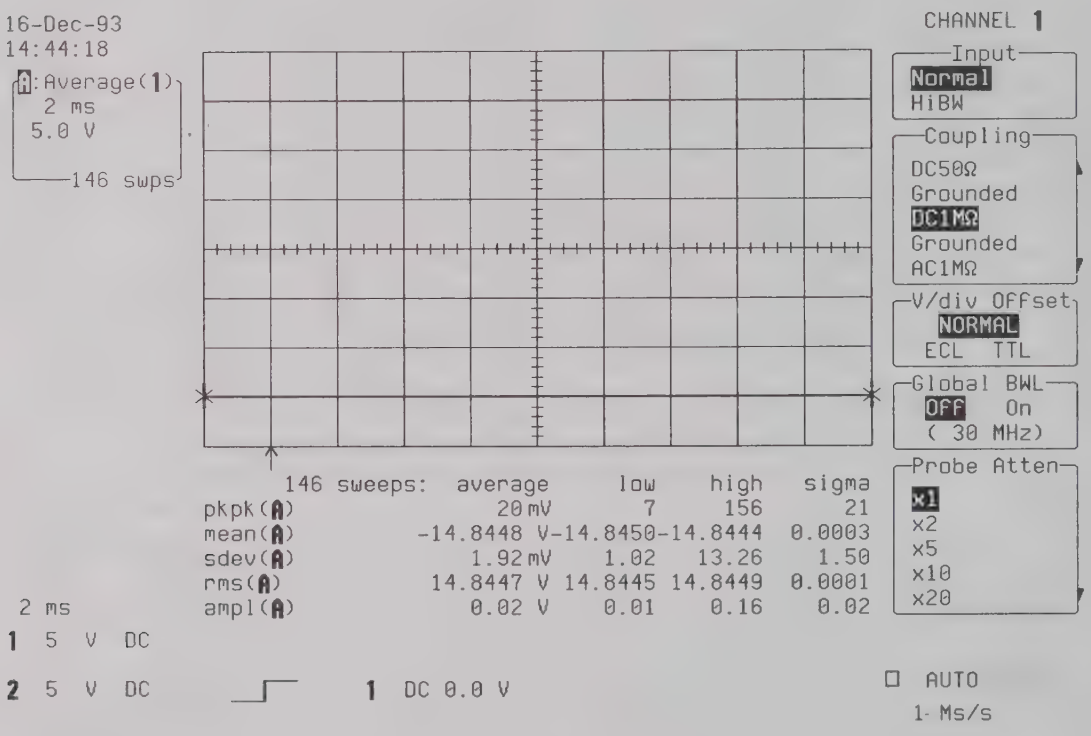
Table 5-4 : 1MΩ DC Linearity Readout Accuracy



- For the ranges **2 mV/div to 5 V/div**, from the high precision voltage source, apply to Channel 1 the following 2 voltages values, one after another : **+ 3 major** screen divisions, **- 3 major** screen divisions.

- For the low sensitivities : **2, 5, 10, 20** and **50 mV/div**, use a **1MΩ 20 dB** attenuator (/10), see table 5-4. For each point, read off the average "Mean" parameter voltage, and compare it to the digital readout of the voltage reference.

- The average mean parameter reading should be within the limits shown in table 5-4.



- Repeat steps 5.7.1.a and 5.7.1.b for Channel 2, substituting channel controls and input connector.

5.7.2 600 MHz High Bandwidth Inputs Linearity (9360 only)

The 9360 high bandwidth DC 50Ω input linearity is tested at 100 mV/div fixed gain.

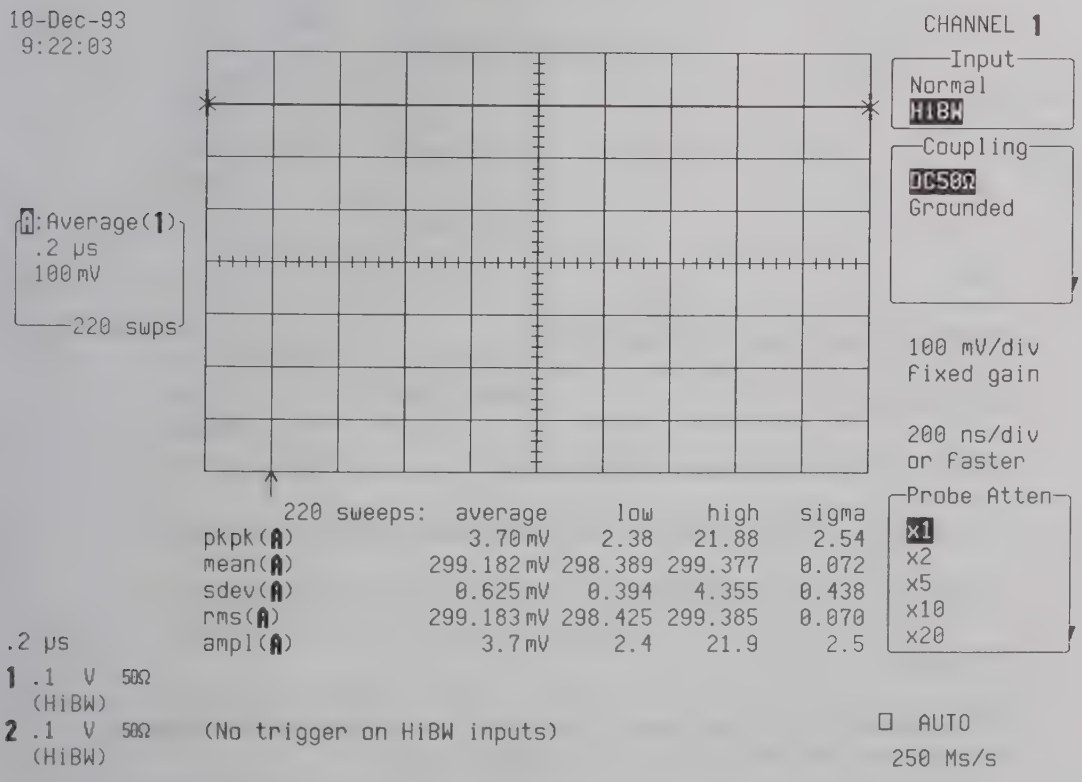
- Set Time base : **.2 µsec**

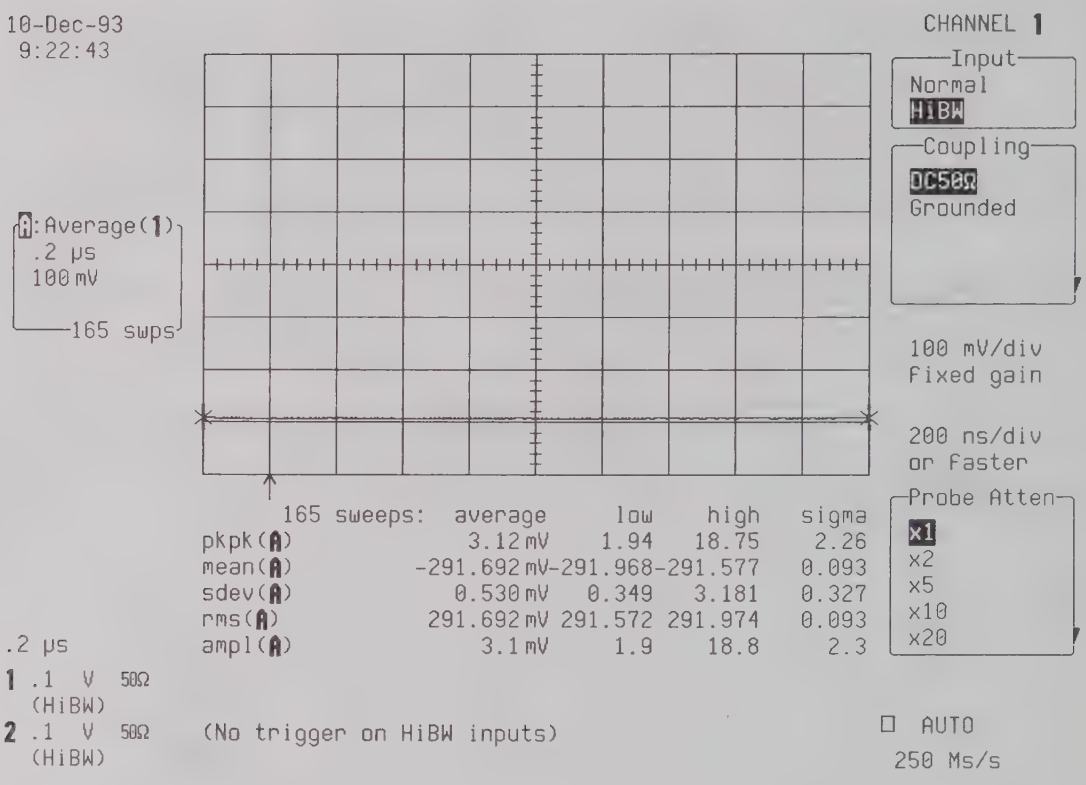
- Input Channel 1 : **HIBW**

- Coupling channel 1 : **DC 50Ω**
- From the high precision voltage source, apply to Channel 1 one after another : +3 major screen divisions, - 3 major screen divisions (+ 300 mV, - 300 mV).
- The average mean parameter reading should be within the limits shown in table below.

Range	**Attenuator**	**Conditions of Test**			**Average Mean Parameter Reading**	
Volts/div Control	20 dB	PS Output	9360 Input	9360 Full scale	Min Value -3 % of FS	Max Value + 3 % of FS
.1 V	No	± 300 mV	± 300 mV	800 mV	± 276 mV	± 324 mV

- Repeat the test for Channel 2, substituting channel controls and input connector.





5.8 Offset

5.8.1 300 MHz Normal Inputs (9360 and 9361)

Specifications

± 120mV ± 5 % : for the ranges 2mV/div, 5 mV/div.

± 1.2 V ± 5 % : for 10 mV/div, 20 mV/div, 50 mV/div, 100 mV/div.

± 24 V ± 5 % : for 200 mV/div, 500 mV/div, 1 V/div, 2 V/div, 5 V/div.

Description

The maximum allowed offsets depend on the sensitivity as shown in table 5-5 and 5-6, and is tested in 1 MΩ, over the full 2 mV to 5 V range.

5.8.1.a Negative Offset Control Procedure (9360 and 9361)

Set the DSO as follows :

- Turn on trace : **Channel 1**

- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Channel 1 : **Normal**
- Coupling Channel 1 : **DC 1MΩ**
- V/div. offset : **Normal**
- Global BWL : **off**
- Probe atten : **X1**
- Input gain : **5 mV**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Auto**
- Holdoff : **Off**
- Timebase : **2 msec/div.**

- Turn on trace : **A**
- Select Math Setup
- For Math : **Use at most 5000 points**
- Redefine A
- Use Math ? : **Yes**
- Math Type : **Average**
- Avg Type : **Summed**
- Of : **Channel 1**

- Turn off trace : **Channel 1**

- Cursors/Measure : **Parameters**
- Mode : **Std Voltage**
- Statistics : **on**
- On displayed trace : **A**

- From the high precision voltage source PS5004, apply to Channel 1 **+ 120 mV** .

- Using the offset control, move Channel 1 trace through the entire range until the maximum offset value is reached : **- 120 mV**.

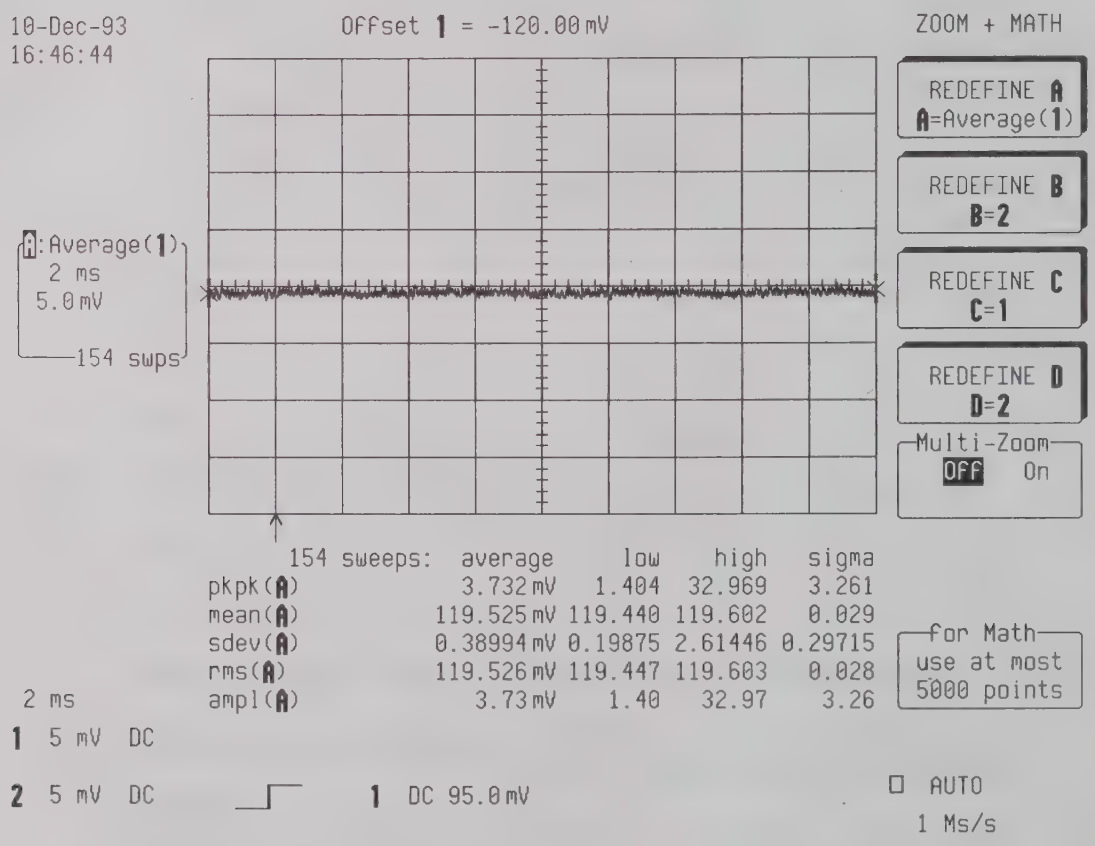
- Verify that the displayed trace A : Average (1) is in the screen, near to the center horizontal graticule line.

- Press clear sweeps.

- Check after at least 100 sweeps that the average mean (A) parameter readout is : **+ 120 mV ± 5 %.**

Range	Conditions of Test		Offset Control	Average Mean Parameter Reading	
Volts/div Control	PS Output	9360/61 Input	9360/61 Offset	Minimum Value, - 5 %	Maximum Value, + 5 %
5 mV	+ 120 m V	+ 120 mV	- 120 mV	+ 114 mV	+ 126 mV
50 mV	+ 1.2 V	+ 1.2 V	- 1.2 V	+ 1.14 V	+ 1.26 V
5 V	+ 24 V	+ 24 V	- 24 V	+ 22.8 V	+ 25.2V

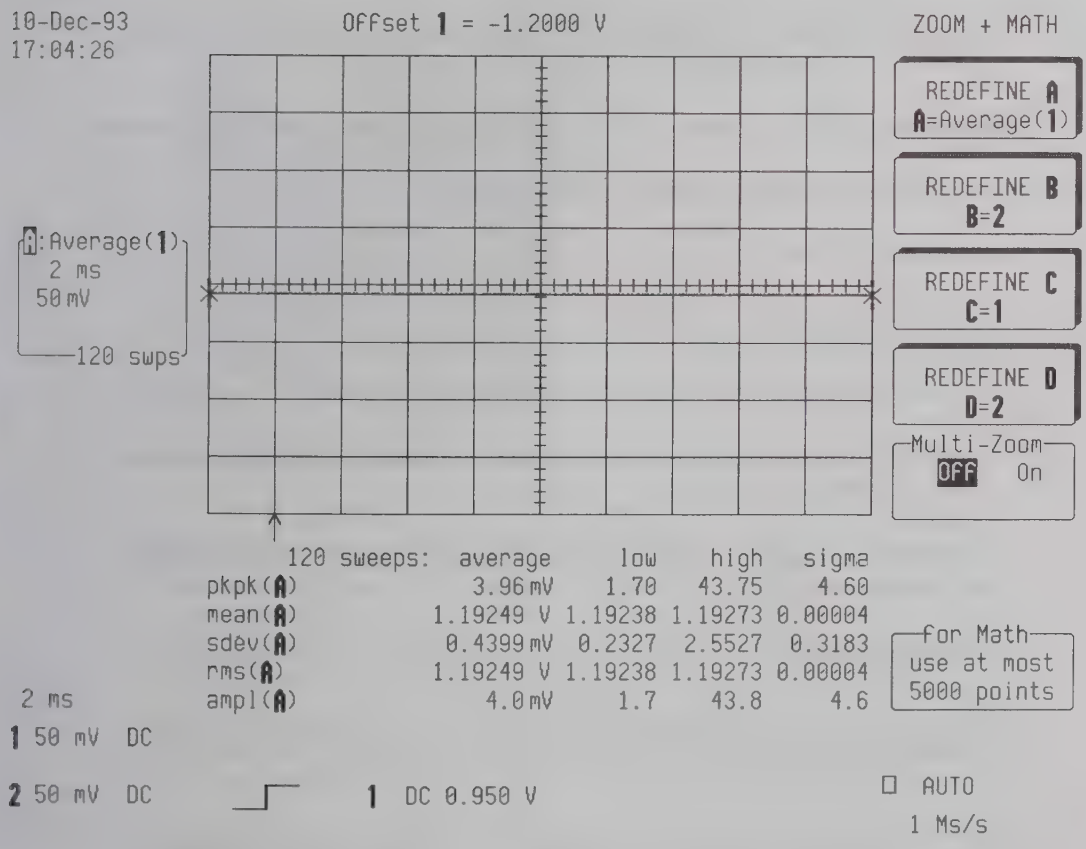
Table 5-5 : Negative offset control



- Set input gain to **50 mV/div**, from the high precision voltage source, apply to Channel 1 the following voltage value : **+ 1.2 V**.

- Using the offset control, move the Ch1 trace through the entire range until the following offset value is reached : **- 1.2 V**.

- Verify that the displayed trace A : Average (1) is in the screen (near to the center horizontal graticule line) .
- Press clear sweeps
- Check after at least 100 sweeps that the average mean (A) parameter readout is : **+ 1.2 V ± 5 %** (see table 5-5).



- Set input gain to **5 V/div**, from the high precision voltage source, apply to Channel 1 : **+ 24 V** (+ 20 V maximum from PS5004).
- Using the offset control, move the Ch1 trace through the entire range until the maximum offset value is reached : **- 24 V**.
- Verify that the displayed trace A : Average (1) is in the screen (near to the center horizontal graticule line) .
- Press clear sweeps
- Check after at least 100 sweeps that the average mean (A) parameter readout is : **+ 24 V ± 5 %** (see table 5-5).
- Repeat step 5.8.1.a for Channel 2, substituting channel controls and input connector.

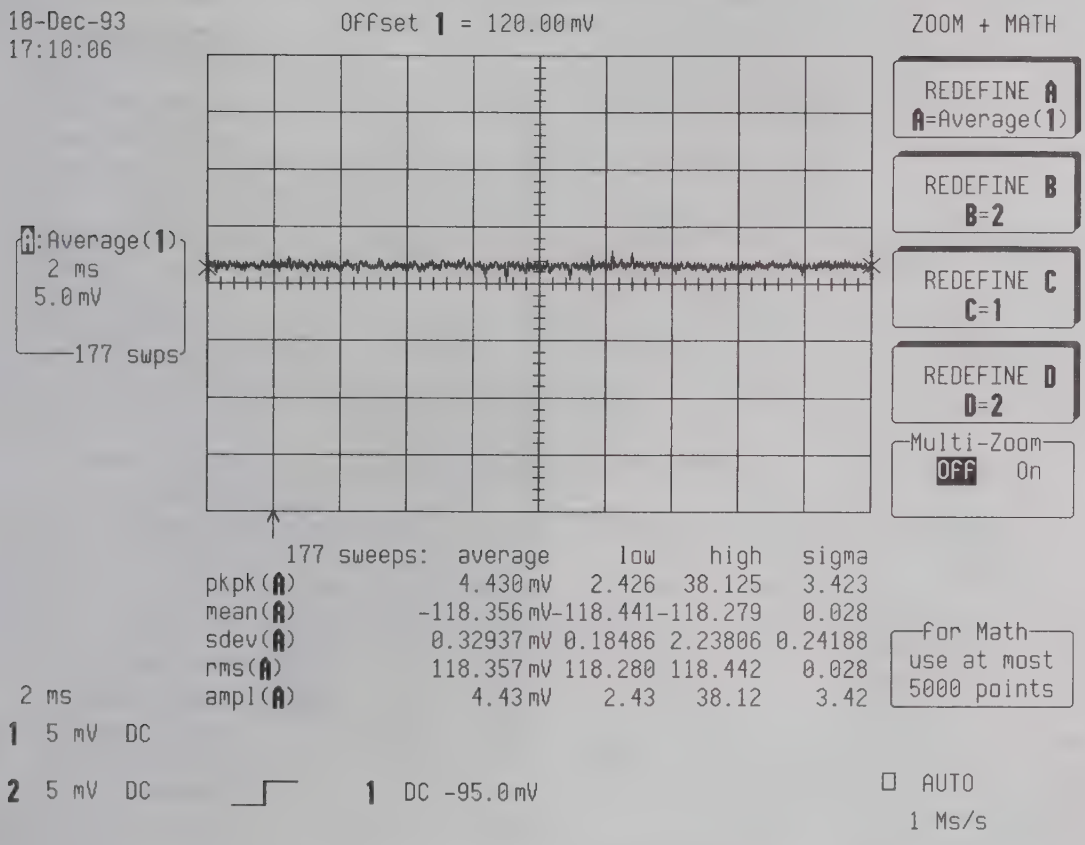
5.8.1.b Positive Offset Control Procedure (9360 and 9361)

Set the DSO as in 5.8.1.a:

- Channel 1 input gain : **5 mV**
- From the high precision voltage source PS5004, apply to Channel 1 : **- 120 mV** .
- Using the offset control, move Channel 1 trace through the entire range until the maximum offset value is reached : **+ 120 mV**.
- Verify that the displayed trace A : Average (1) is in the screen, near to the center horizontal graticule line.
- Press clear sweeps.
- Check after at least 100 sweeps that the average mean (A) parameter readout is : **- 120 mV ± 5 %.**

Range	Conditions of Test		Offset Control	Average Mean Parameter Reading	
Volts/div Control	PS Output	9360/61 Input	9360/61 Offset	Minimum Value, - 5 %	Maximum Value, + 5 %
5 mV	- 120 m V	- 120 mV	+ 120 mV	- 114 mV	- 126 mV
50 mV	- 1.2 V	- 1.2 V	+ 1.2 V	- 1.14 V	- 1.26 V
5 V	- 24 V	- 24 V	+ 24 V	- 22.8 V	- 25.2 V

Table 5-6 : Positive offset control



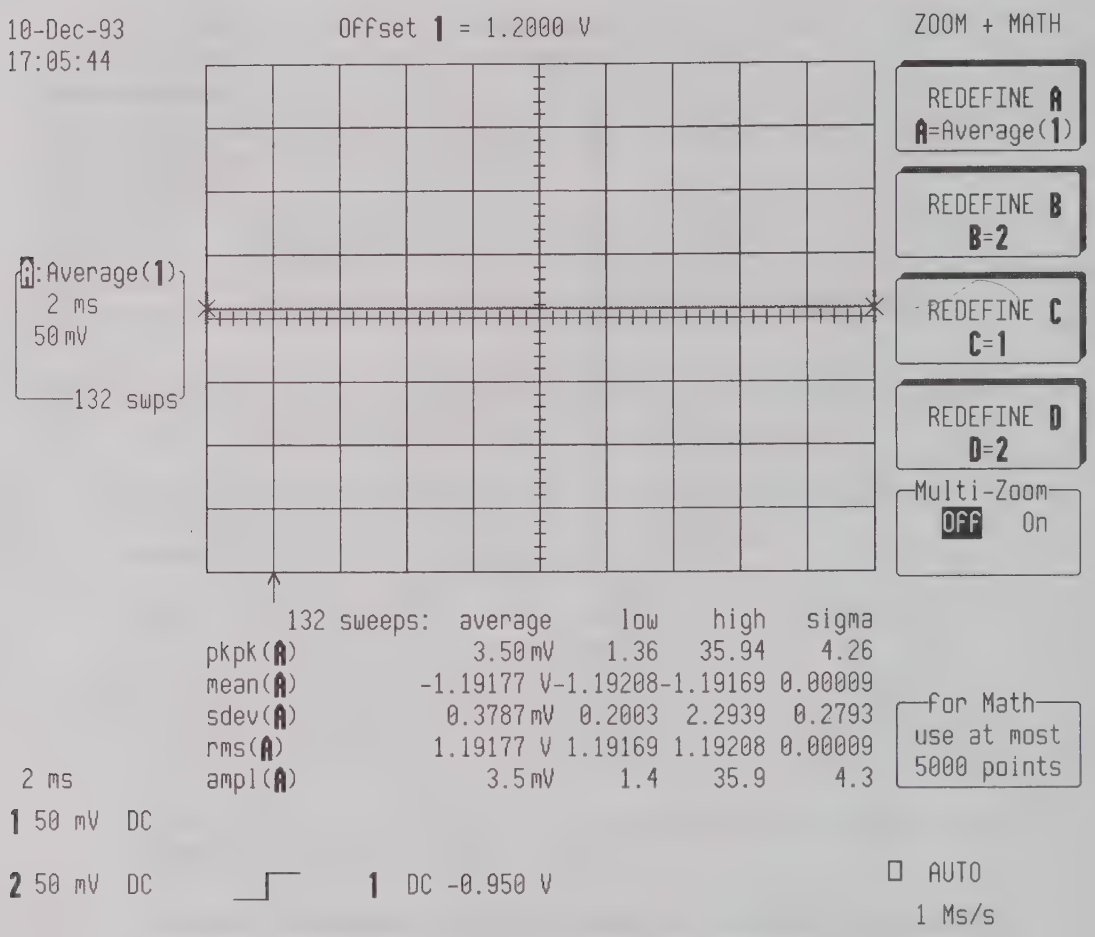
- Set input gain to **50 mV/div**, from the high precision voltage source, apply to Channel 1 the following voltage value : **+ 1.2 V**.

- Using the offset control, move the Ch1 trace through the entire range until the following offset value is reached : **- 1.2 V**.

- Verify that the displayed trace A : Average (1) is in the screen (near to the center horizontal graticule line) .

- Press clear sweeps

- Check after at least 100 sweeps that the average mean (A) parameter readout is : **+ 1.2 V ± 5 %** (see table 5-6).



- Set input gain to **5 V/div**, from the high precision voltage source, apply to Channel 1 - **24 V** (- 20 V maximum from PS5004)
- Using the offset control, move the Ch1 trace through the entire range until the maximum offset value is reached : + **24 V**.
- Verify that the displayed trace A : Average (1) is in the screen (near to the center horizontal graticule line) .

- Press clear sweeps

- Check after at least 100 sweeps that the average mean (A) parameter readout is : **- 24 V ± 5 %** (see table 5-6).

- Repeat step 5.8.1.b for Channel 2, substituting channel controls and input connector.

5.8.2 600 MHz High Bandwidth Inputs (9360 only)

Specifications

± 400 mV at 100 mV/div fixed gain

5.8.2.a Negative Offset Control Procedure (9360 only)

Set the DSO as follows :

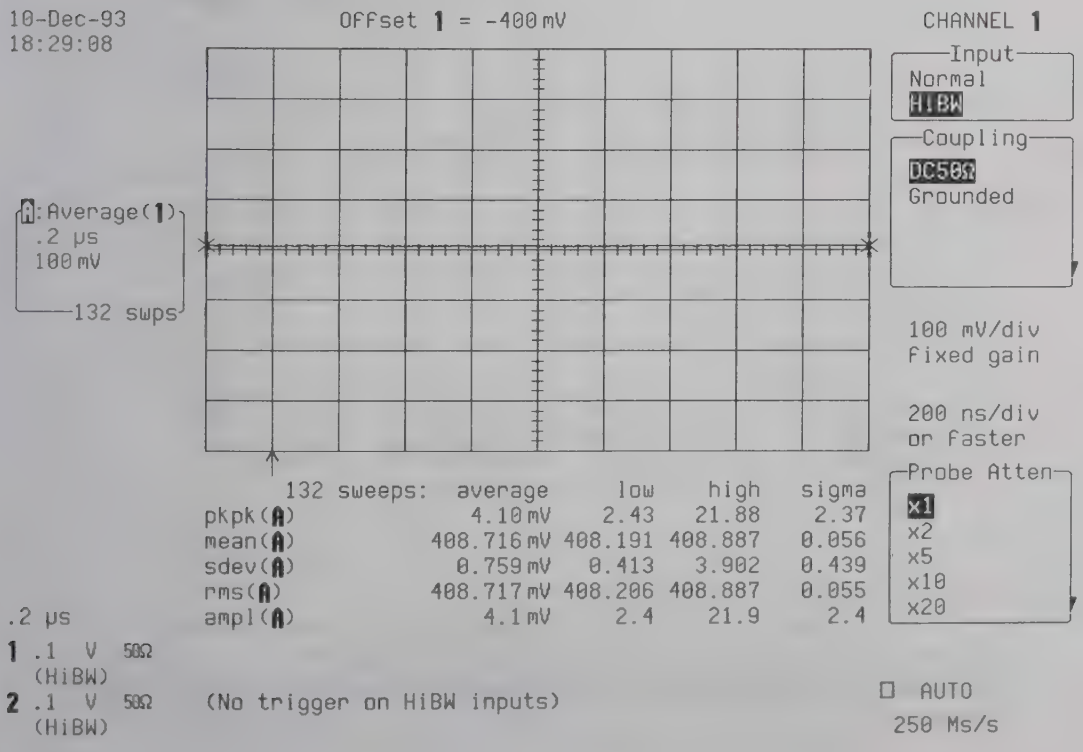
- Time base : **.2µsec**
- Input Channel 1 : **HIBW**
- Coupling Channel 1: **DC 50Ω**

Range	Conditions of Test		Offset Control	Average Mean Parameter Reading	
Volts/div Control	PS Output	9360 Input	9360 Offset	Minimum Value, - 5 %	Maximum Value, + 5 %
100 mV	+ 400 m V	+ 400 mV	- 400 mV	+ 380 mV	+ 420 mV

Table 5-7 : Negative offset control

- From the high precision voltage source PS5004, apply to Channel 1 **+ 400 mV** .
- Using the offset control, move Channel 1 trace through the entire range until the maximum offset value is reached : **- 400 mV**.
- Verify that the displayed trace A : Average (1) is in the screen, near to the center horizontal graticule line.
- Press clear sweeps.

- Check after at least 100 sweeps that the average mean (A) parameter readout is : **+ 400 mV ± 5 %**



5.8.2.b Positive Offset Control Procedure (9360 only)

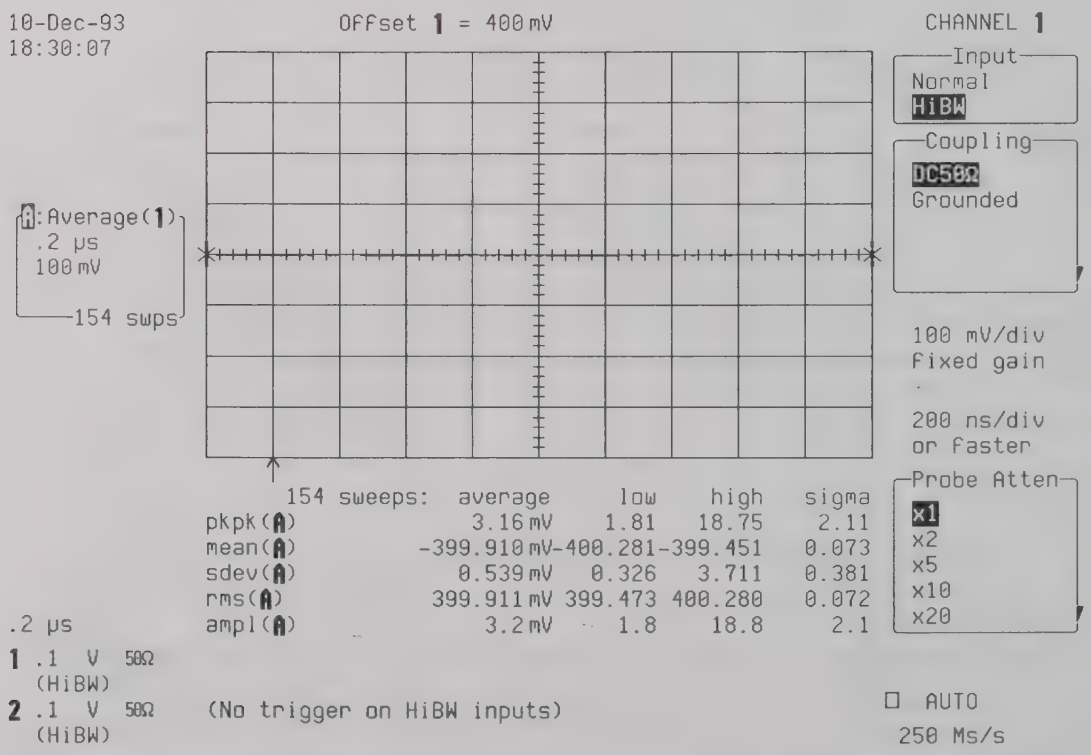
Set the DSO as in 5.8.2.a :

Range	Conditions of Test		Offset Control	Average Mean Parameter Reading	
Volts/div Control	PS Output	9360 Input	9360 Offset	Minimum Value, - 5 %	Maximum Value, + 5 %
100 mV	- 400 m V	- 400 mV	+ 400 mV	- 380 mV	- 420 mV

Table 5-8 : Positive offset control

- From the high precision voltage source PS5004, apply to Channel 1 **- 400 m/V**.
- Using the offset control, move Channel 1 trace through the entire range until the maximum offset value is reached : **+ 400 mV**.
- Verify that the displayed trace A : Average (1) is in the screen, near to the center horizontal graticule line.

- Press clear sweeps.
- Check after at least 100 sweeps that the average mean (A) parameter readout is : **- 400 mV ± 5 %.**



- Repeat step 5.8.2.a and 5.8.2.b for Channel 2, substituting channel controls and input connector.

5.9 Bandwidth

5.9.1 300 MHz Normal Inputs Bandwidth (9360 and 9361)

Specifications

DC to at least 300 MHz (- 3dB)

The purpose of this test is to ensure that the entire system has a bandwidth of at least 300 MHz. An external source is used as the reference to provide a signal where amplitude and frequency are well controlled. A serious measurement of the bandwidth requires the use of a source whose amplitude does not change with frequency.
The LeCroy calibration software corrects for the measured amplitude variation of the generator used. Generators can have errors of - 2 dB above 500 MHz. The non flatness of the generator should be taken into consideration.

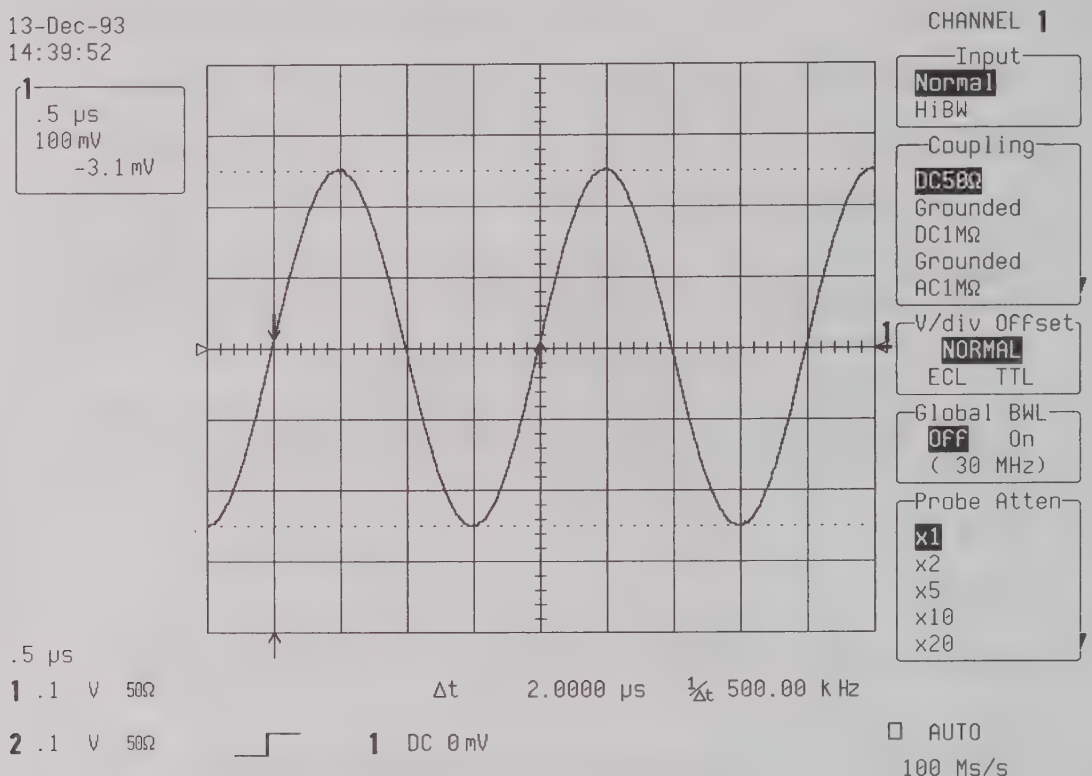
5.9.1.a DC 50 Ω

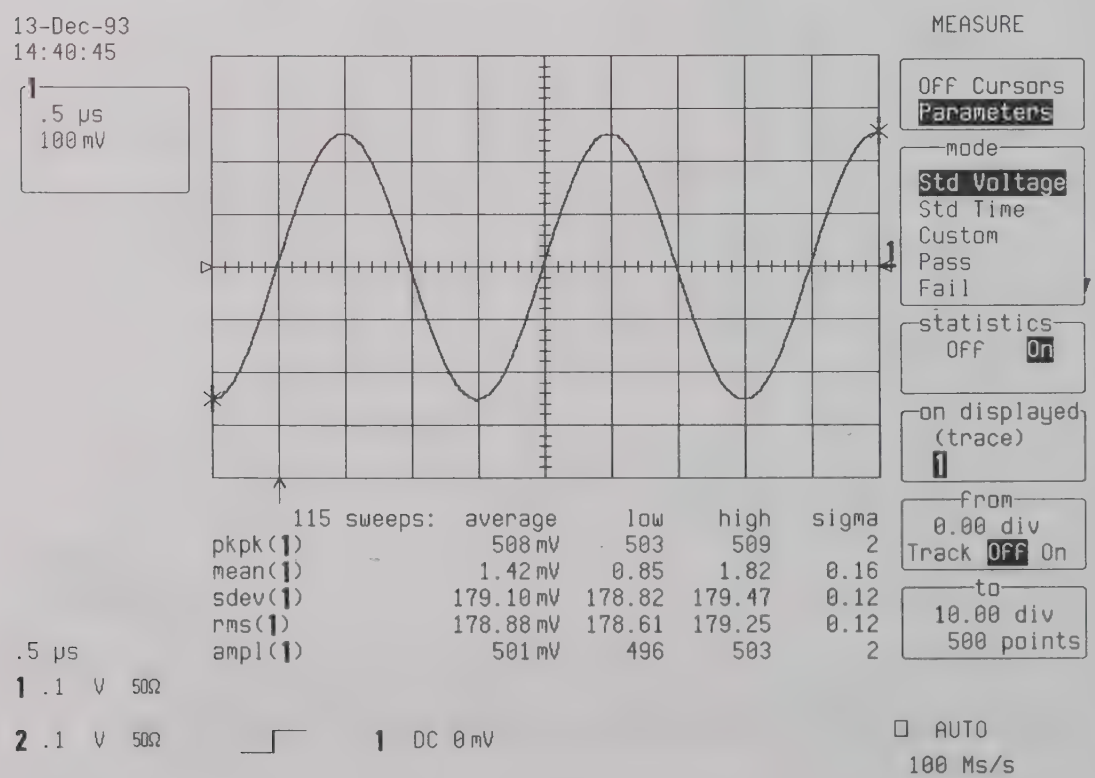
Procedure

Set DSO as follows :

- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Channel 1 : **Normal**
- Coupling Channel 1: **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input gain : **100 mV/div**
- Offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **1**
- Trigger level : **0 mV**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Norm**
- Timebase : **.5 µsec/div**
- Cursors/Measure : **Parameters**
- Mode : **Std Voltage**
- Statistics : **On**
- On displayed trace : **1**

- Connect a leveled sine wave generator to Channel 1 (i.e Marconi 2030), set the frequency to **500 KHz**, adjust the generator output amplitude to get a **500 mV** amplitude sine wave (5 divisions), and check amplitude of the signal with DSO parameter ampl(1).


13-Dec-93
14:39:52
1
.5 µs
100 mV
-3.1 mV
CHANNEL 1
Input
Normal
HiBW
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
.5 µs
1 .1 V 50Ω
Δt 2.0000 µs 1/Δt 500.00 kHz
2 .1 V 50Ω
1 DC 0 mV
AUTO
100 Ms/s

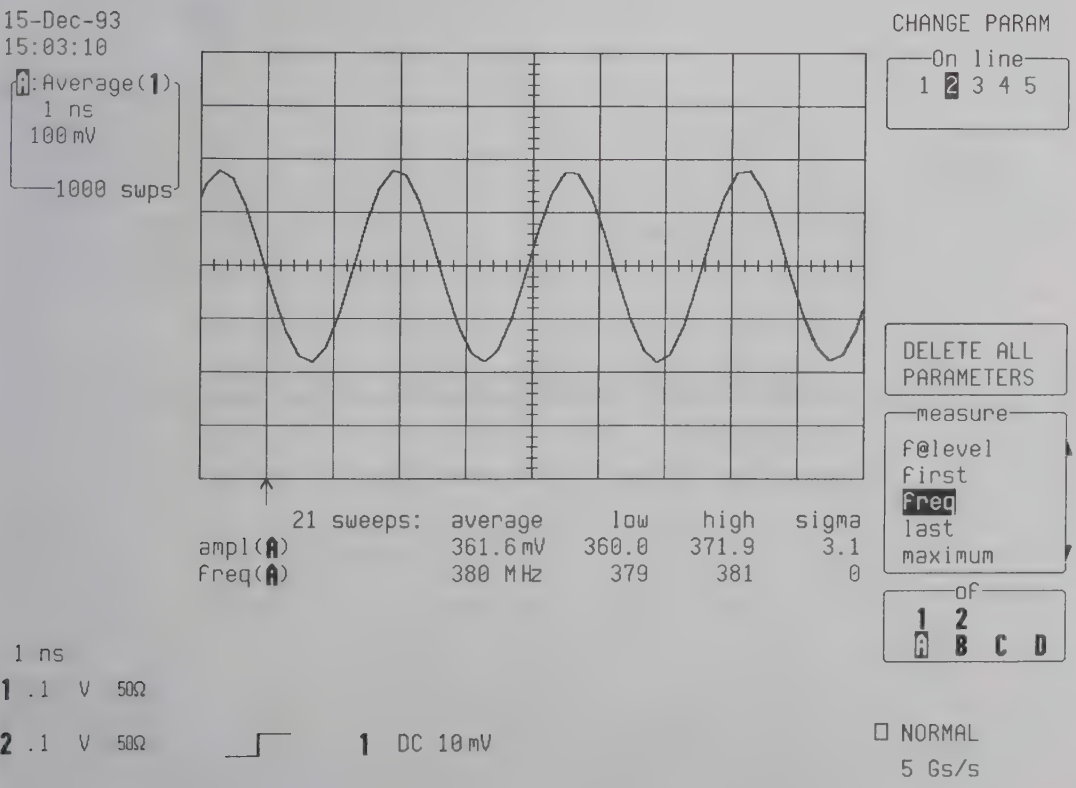

13-Dec-93
14:40:45
1
.5 µs
100 mV
MEASURE
Off Cursors
Parameters
mode
Std Voltage
Std Time
Custom
Pass
Fail
statistics
Off On
on displayed
(trace)
1
from
0.00 div
Track Off On
to
10.00 div
500 points
115 sweeps: average low high sigma
pkpk(1) 508 mV 503 509 2
mean(1) 1.42 mV 0.85 1.82 0.16
sdev(1) 179.10 mV 178.82 179.47 0.12
rms(1) 178.88 mV 178.61 179.25 0.12
ampl(1) 501 mV 496 503 2
.5 µs
1 .1 V 50Ω
2 .1 V 50Ω
1 DC 0 mV
AUTO
100 Ms/s

- Turn on trace : **A**
- Select Math Setup
- For Math : **Use at most 5000 points**
- Redefine A
- Use Math ? : **Yes**
- Math Type : **Average**
- Avg Type : **Summed**
- Of : **Channel 1**

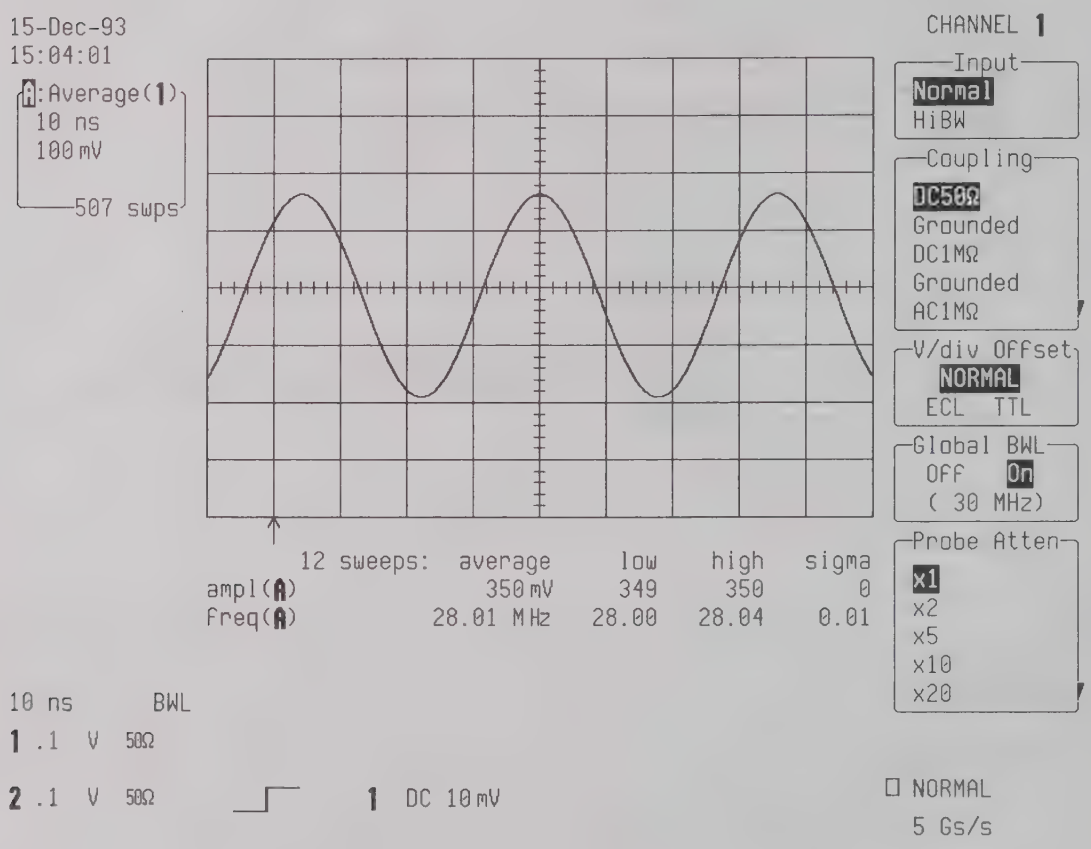
- Turn off trace : **Channel 1**
- Parameters on : **Displayed trace A**
- Mode : **Custom**
- Change parameters : **Measure**
- On line 1 : **Ampl of A**
- On line 2 : **Frequency of A**

- Increase the generator frequency, while decreasing the time/div. until the sine wave peak to peak amplitude is **350 mV** : **.7 X 5 divisions = 3.5 divisions (3 dB)** or **70%** of the initial amplitude at **500 KHz**.

- Check : The frequency of the generator must be at least **300 MHz**.



- Select Coupling and **Global BWL : On** (bandwidth limiter on)
- Check that the frequency at the **3 dB** point is typically **30 MHz** . (between 22 MHz and 43 MHz).



- Repeat step 5.9.1.a for Channel 2, substituting channel control and input connector.

5.9.1.b 1 MΩ

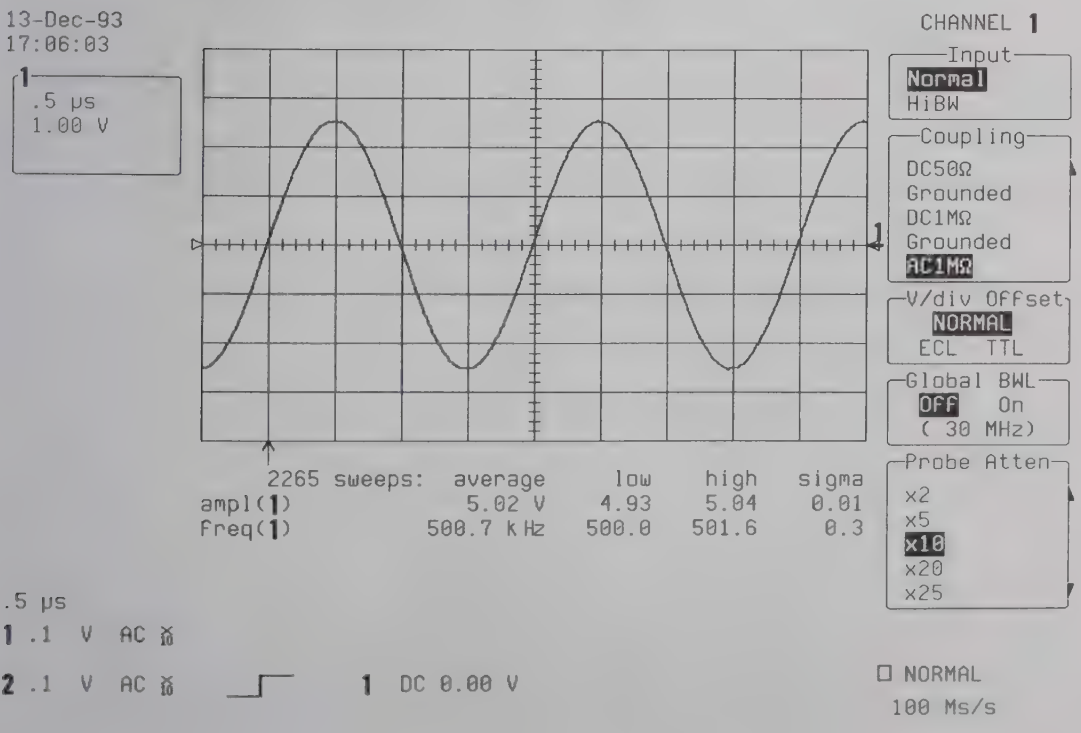
The purpose of this test is to ensure that the entire 9360/61 system has a bandwidth of at least **250 MHz** at probe tip.
Set up a Tektronix SG503 leveled sine wave generator or equivalent.

- Frequency : **500 KHz**
- Amplitude : **5V peak to peak**

- Terminate the output of the SG503 via a **50Ω feed through** and connect it to the Channel 1input through a **10X-probe** using a probe tip BNC Jack adapter.
  Make sure the probe compensation is perfectly adjusted, low frequency.

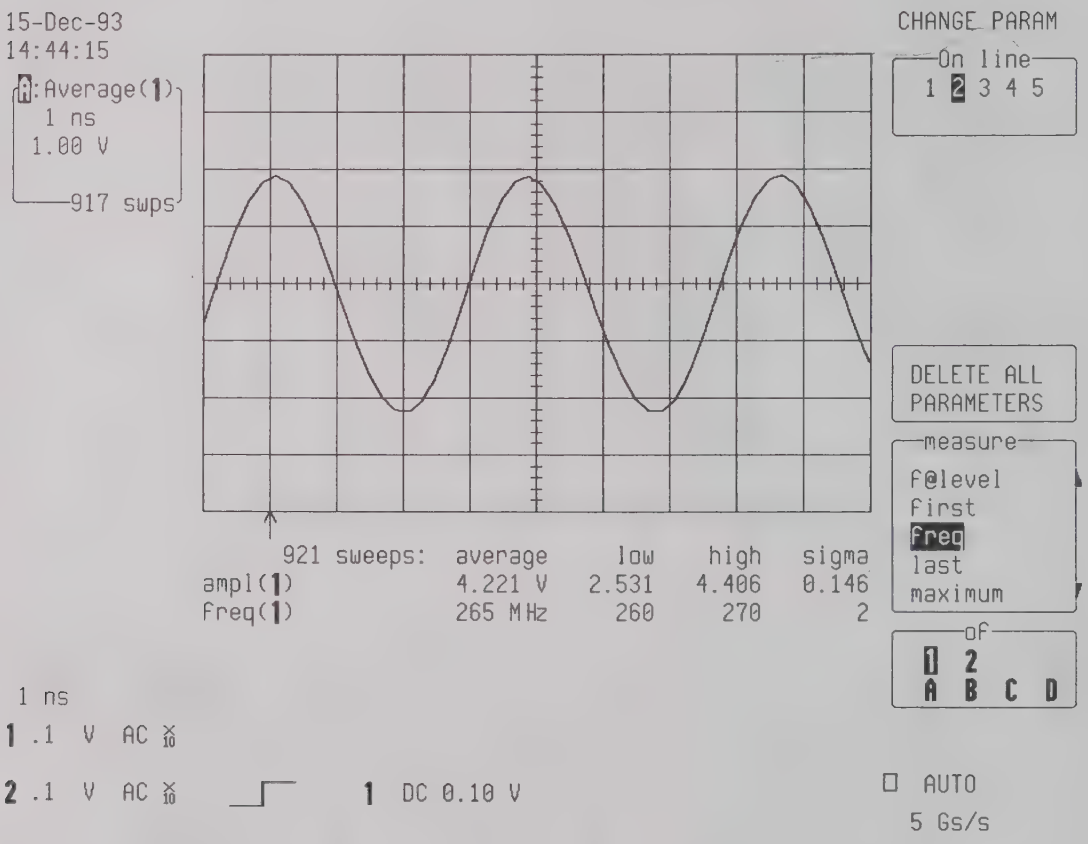
- Turn on trace : **Ch1**
- Input Channel 1 : **Normal**
- Coupling Channel 1: **AC 1MΩ**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X10**
- Input gain : **100 mV/div**
- Time base : **.5 µsec**

- Set the SG503 output amplitude and the channel 1 offset to provide a 5 divisions peak to peak sine wave.

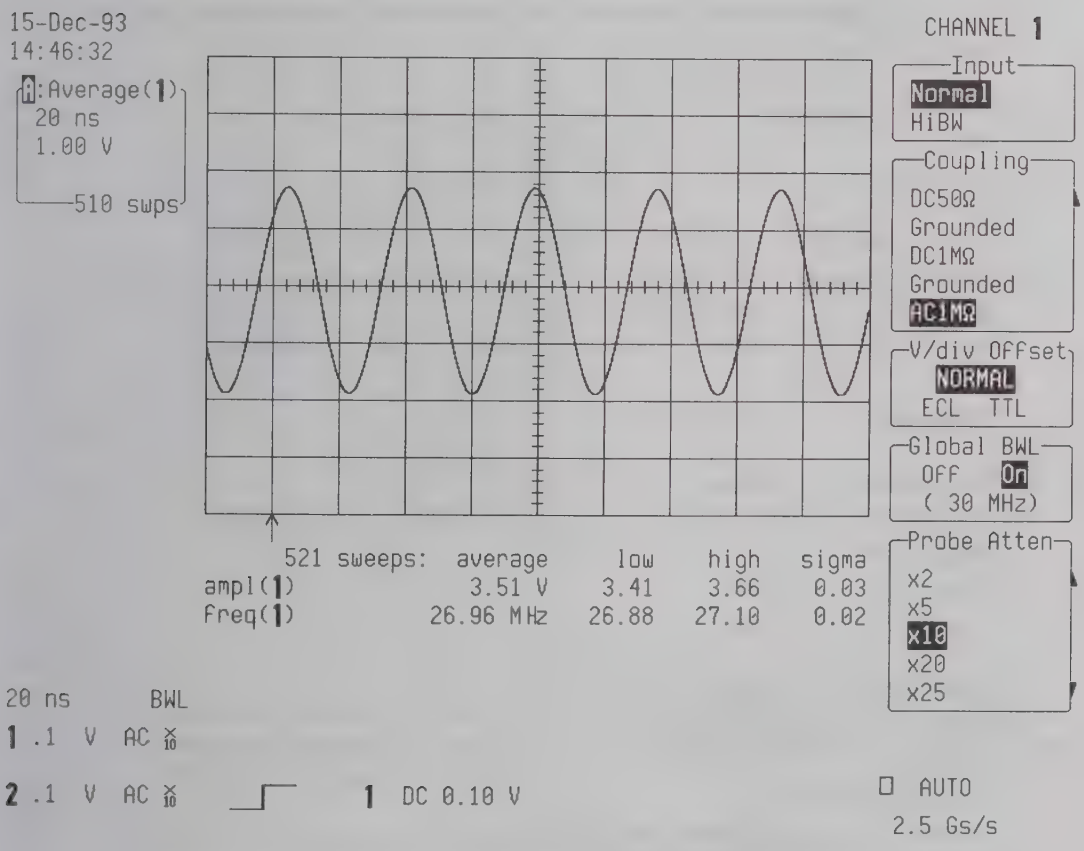


- Increase the SG503 frequency, while decreasing the time/div. until the sine wave peak to peak amplitude **is 3.5 V : .7 X 5 divisions = 3.5 divisions (3 dB) or 70%** of the initial amplitude at **500 KHz**.

- Check : The frequency of the generator must be at least **250 MHz.**



- Set the bandwidth limiter on :
- Select Coupling and **Global BWL : On**
- Check that the frequency at the 3 dB point is typically **30 MHz** .
  (between 22 MHz and 43 MHz).



- Repeat step 5.9.1.b for Channel 2, substituting channel control and input connector.

5.9.2 600 MHz High Bandwidth Inputs (9360 only)

Specification

DC to at least 600 MHz (- 3dB)

Description

There is no trigger on 9360 HIBW inputs. The bandwidth is tested at 100 mV/div fixed gain in auto trigger mode.

Set DSO as follows :

- Turn on trace : **Ch1**

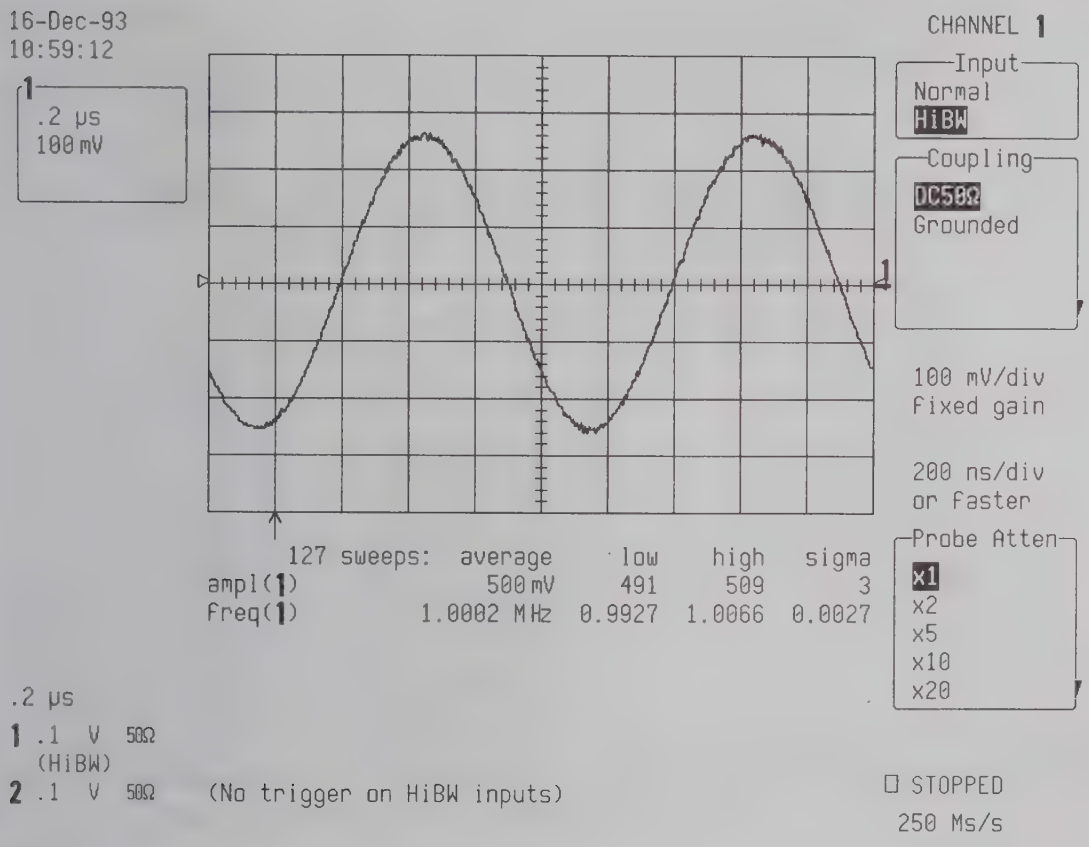
- Input Channel 1 : **HIBW**
- Coupling Channel 1: **DC 50 Ω**
- Fixed gain : **100 mV/div**
- Offset : **0 mV**

- Timebase : **.2 μsec/div**

- Trigger setup : **Edge**
- Trigger on : **1**
- Trigger level : **0 mV**
- Coupling 1 : **DC**
- Trigger mode : **Auto**

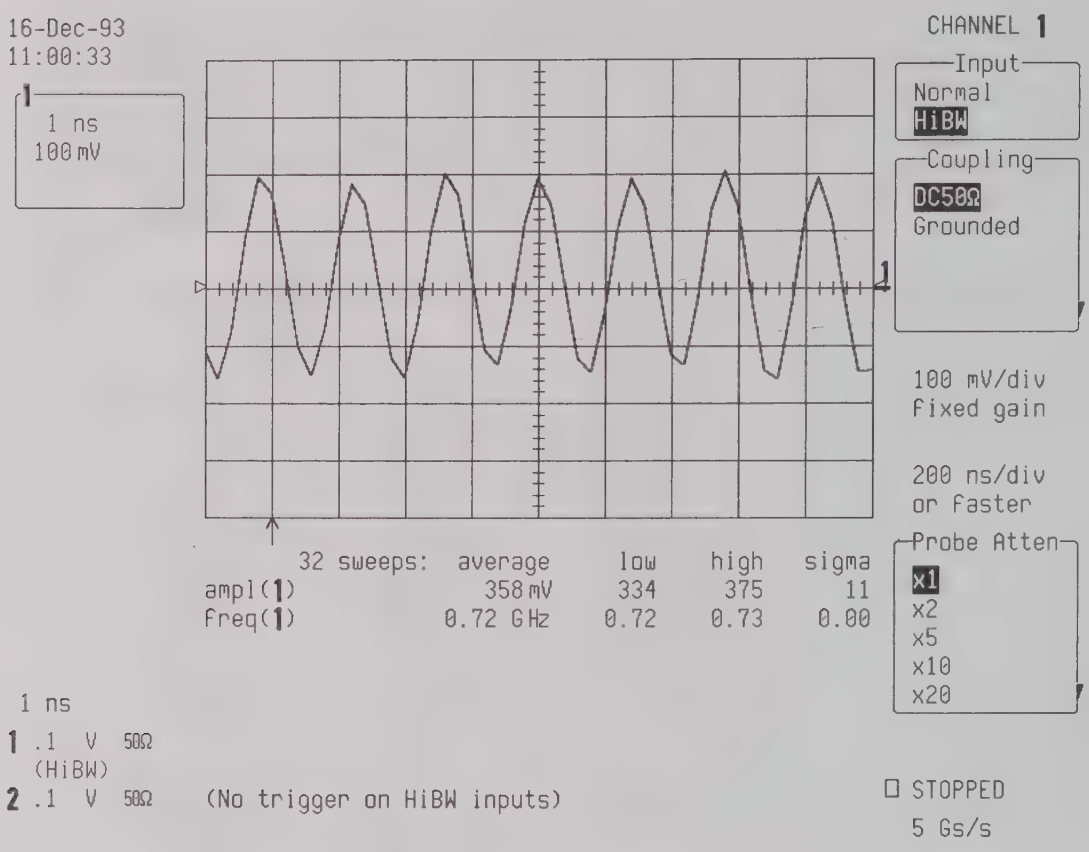
- Cursors/Measure : **Parameters**
- Mode : **Custom**
- Statistics : **On**
- Change parameters :
- On line 1 : **Measure ampl of 1**
- On line 2 : **Measure freq of 1**

- Connect a leveled sine wave generator to Channel 1, set the frequency to **1 MHz**, adjust the generator output to get a **500 mV** amplitude sine wave, and check amplitude of the signal with DSO parameter ampl(1).



- Increase the generator frequency, while decreasing the time/div. until the sine wave peak to peak amplitude is **350 mV : .7 X 5 divisions = 3.5 divisions (3 dB) or 70%** of the initial amplitude at **1 MHz**.

- Check : The frequency of the generator must be at least **600 MHz**.

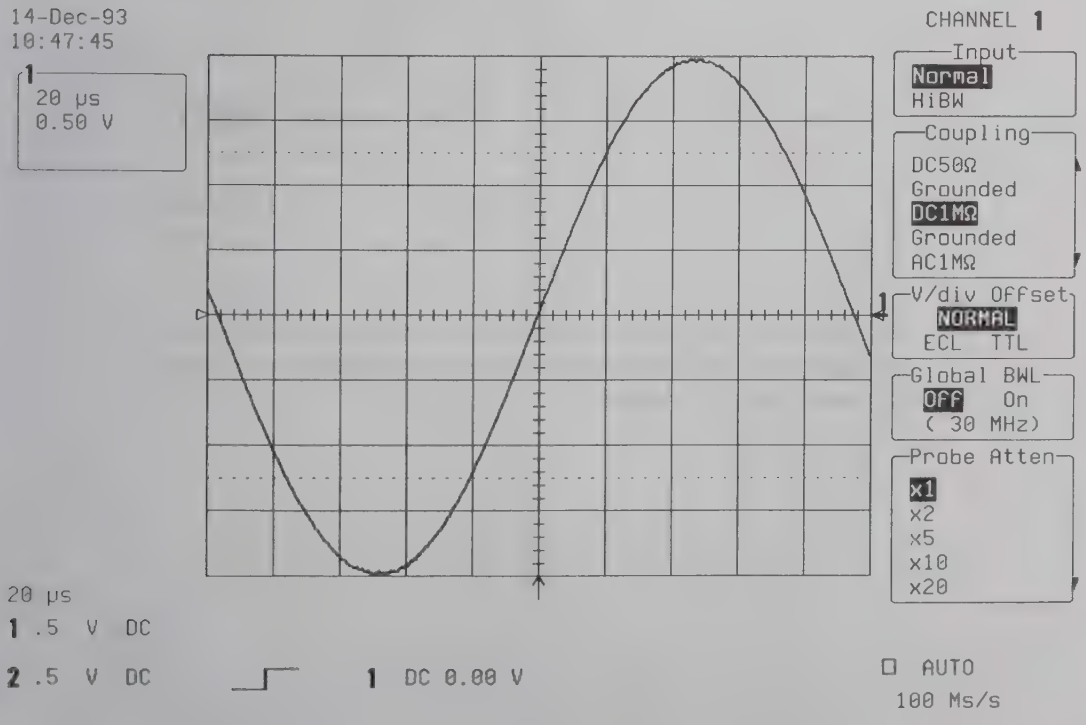


- Repeat the test for Channel 2, substituting channel control and input connector.

5.10 Trigger Level

5.10.1 300 MHz Normal Inputs (9360 and 9361)

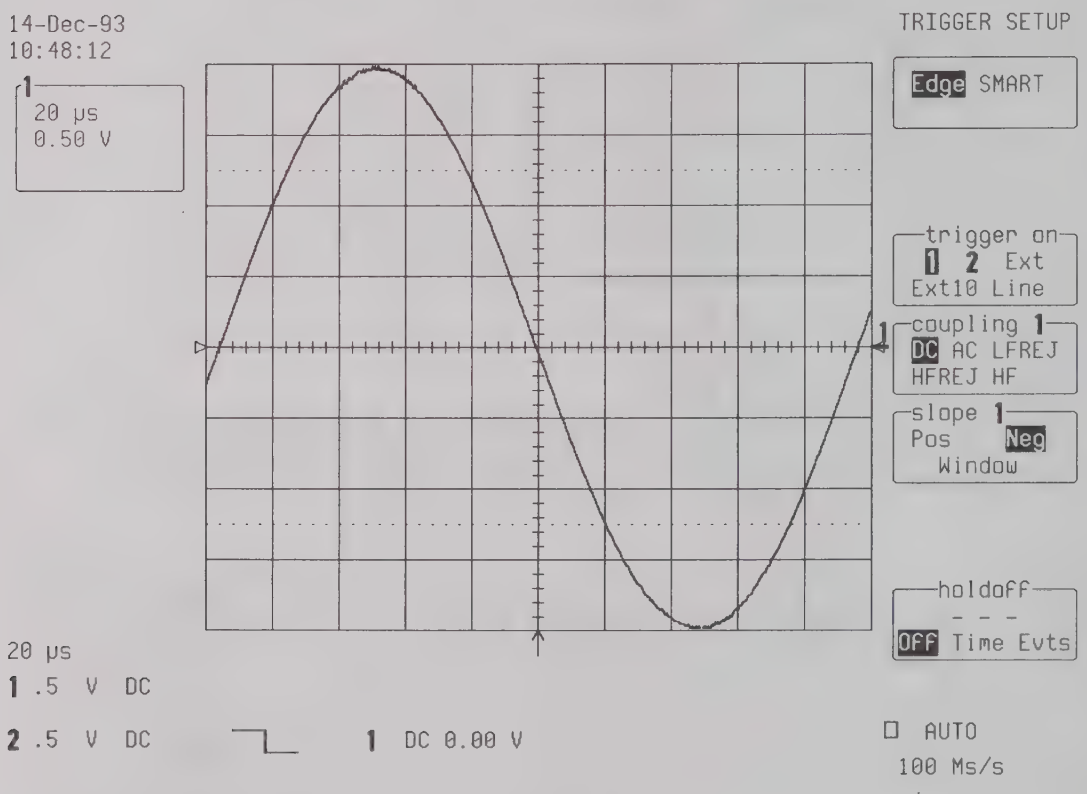
- The trigger level accuracy is tested at different DC levels : + 3, 0, - 3 major screen divisions. Setup any sine wave generator capable of generating sine waves of 5 KHz.
- Connect the generator output to Channel 1
- Turn on trace : **Ch1**
- Input Channel 1 : **Normal**
- Coupling Channel 1: **DC 1M Ω**
- V/div. offset : **Normal**
- Input gain : **.5 V/div**
- Input offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Auto or Norm**
- Pre-Trigger Delay : **50 %**
- Timebase : **20 µsec/div**
- Set Trigger level : **DC 0.0 mV**
- Adjust the sine wave generator's output amplitude to get **8 divisions** peak to peak, corresponding to a **2 V** amplitude. It is important that the offset of the input is set to **zero mV**, use show status and acquisition status to verify.



- Check : The sine wave must pass through the **horizontal center** of the screen (50 % pretrigger line) at the **vertical position zero** (vertical center) within ± **2 minor** vertical divisions.

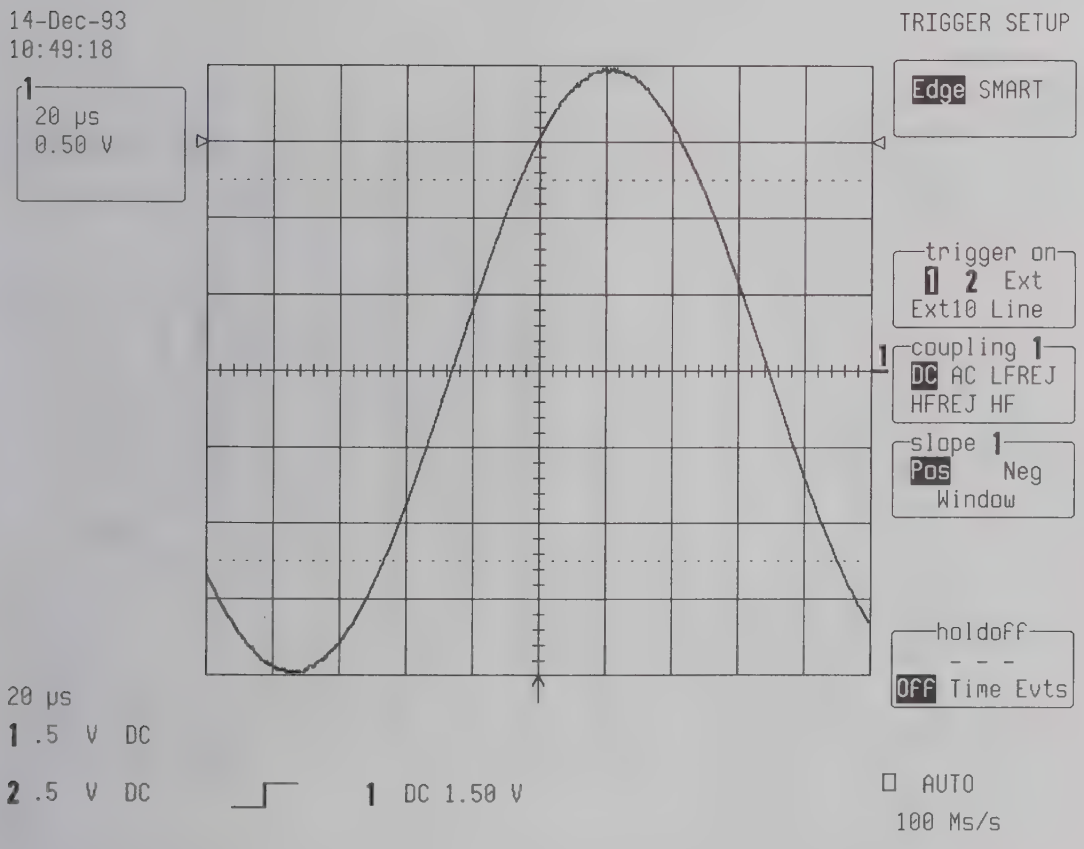
- Repeat the test for the following conditions :

- Slope 1 : **Neg**

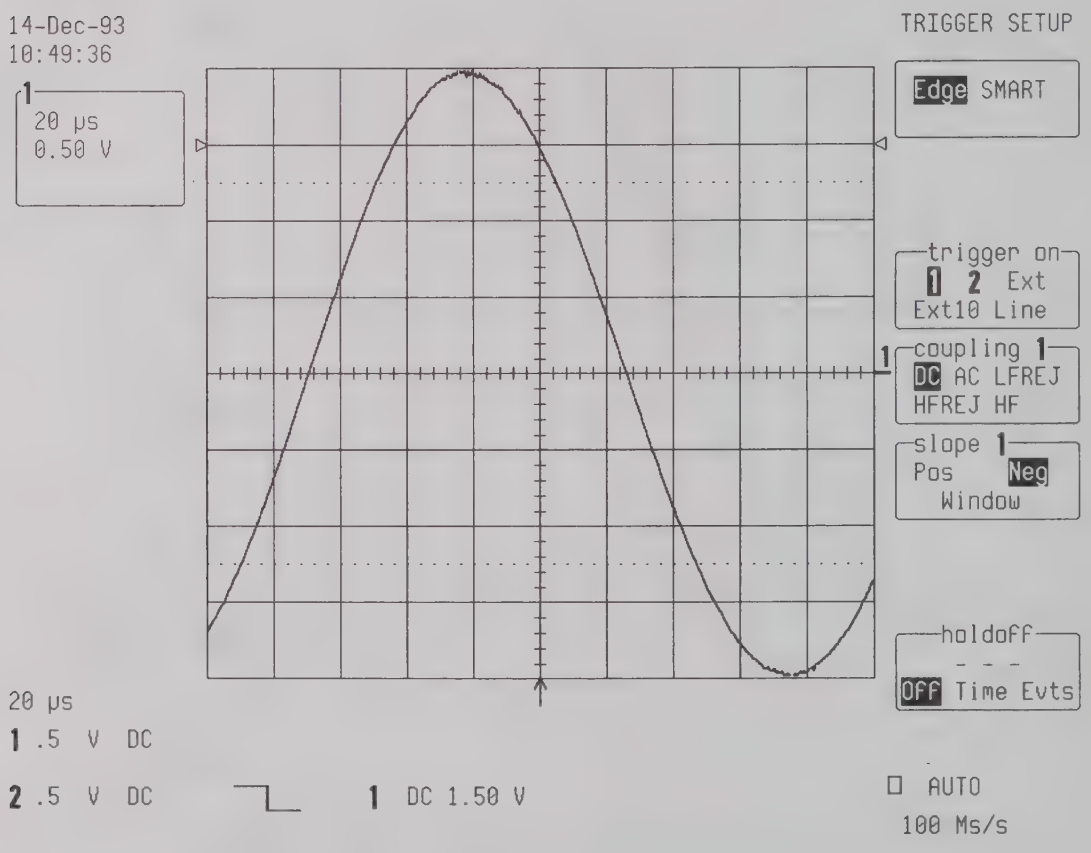


- Check : The sine wave must pass through the **horizontal center** of the screen (50 % pretrigger line) at the **vertical position zero** (vertical center) within ± **2 minor** vertical divisions.

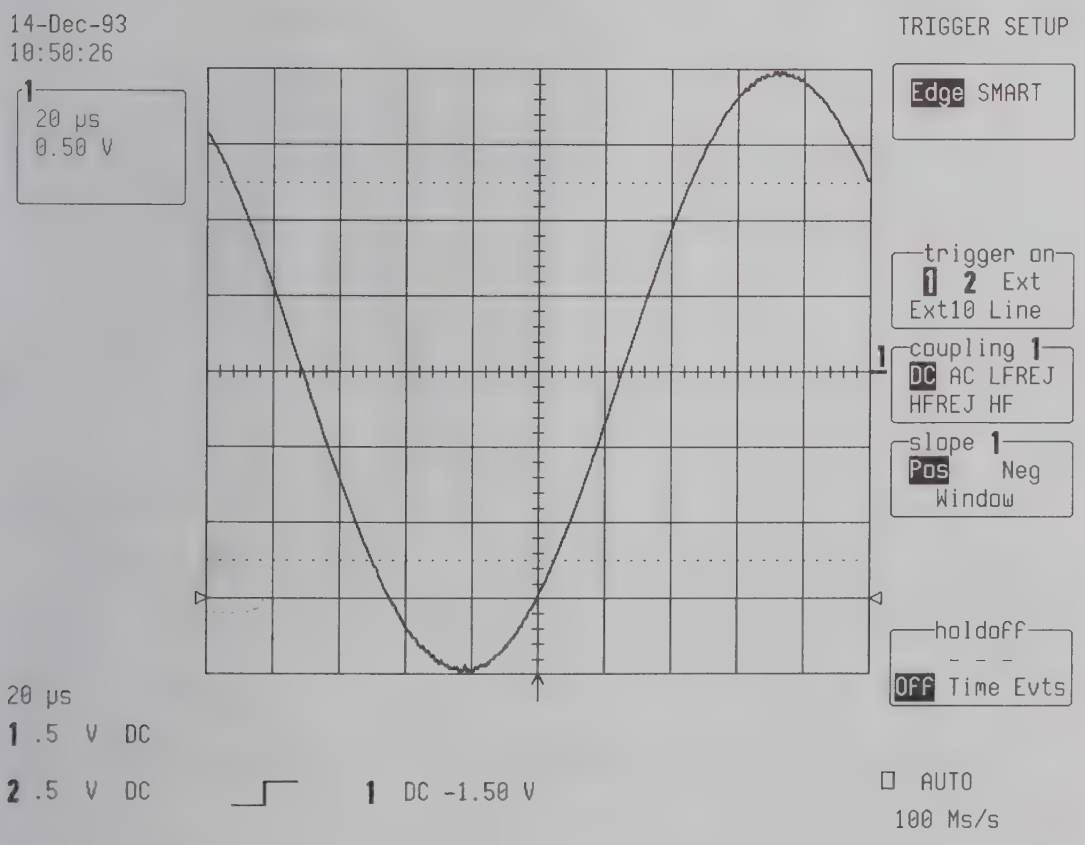
- Set Trigger level : **DC + 1.5 V**
- Slope 1 : **Pos**
- Check : The sine wave must pass the **horizontal center** at **+ 3 divisions** within **± 2 minor** vertical divisions.



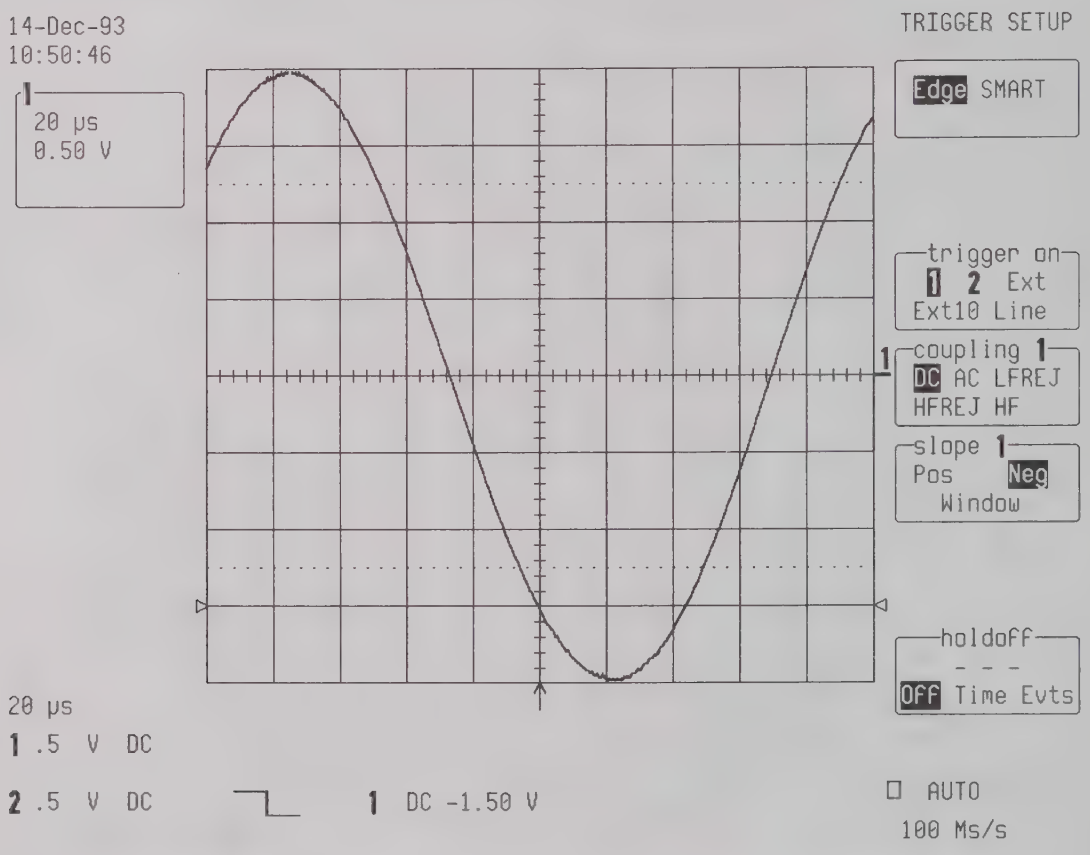
- Repeat the test for the following conditions :
- Slope 1 : **Neg**
- Check : The sine wave must pass the **horizontal center** at + **3 divisions** within ± **2 minor** vertical divisions.



- Repeat the test for the following conditions :
- Trigger level : **DC - 1.5 V**
- Slope 1 : **Pos**
- Check : The sine wave must pass the **horizontal center** at **- 3 divisions** within **± 2 minor** vertical divisions.



- Select Slope 1 : **Neg**
- Check : The sine wave must pass the **horizontal center** at **- 3 divisions** within **± 2 minor** vertical divisions.



- Repeat step 5.10.1 for Channel 2, substituting channel control and input connector.

5.10.2 External Trigger

Specifications

External trigger voltage range : DC ± .5 V

Procedure

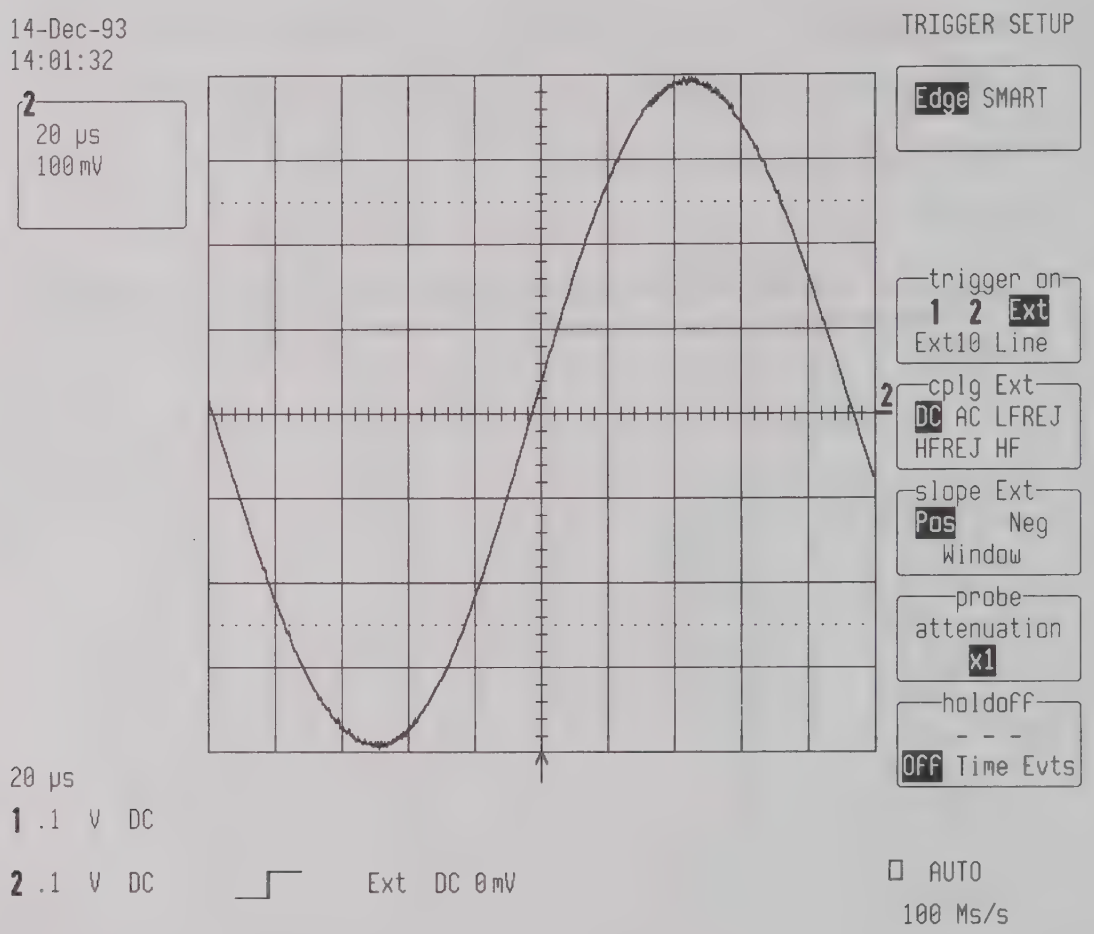
- Connect the output of the generator to **External** input and to **Channel 2** via a coaxial T-connector. The cable length from **External to Channel 2** must be short, at most **2 nsec**.

- Set DSO as follows :

- Turn on trace : **Ch2**
- Input Channel 2 : **Normal**
- Coupling : **DC 1MΩ**
- V/div. offset : **Normal**
- Probe atten : **X1**
- Input gain : **.1 V/div**
- Input offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **Ext**
- Coupling Ext : **DC**
- Slope Ext : **Pos**
- Set Trigger level : **DC 0.0 mV**
- Time base : **20 μsec**

- Adjust the sine wave generator's output amplitude to get **8 divisions** peak to peak, corresponding to a **.4 V** amplitude. It is important that the offset of the input is set to **zero mV**, use show status and acquisition status to verify.

- Set frequency : **5 KHz**



- Check : The sine wave must pass through the **horizontal center** of the screen (50 % pretrigger line) at the **vertical position zero** (vertical center) within **± 3 minor** vertical divisions.

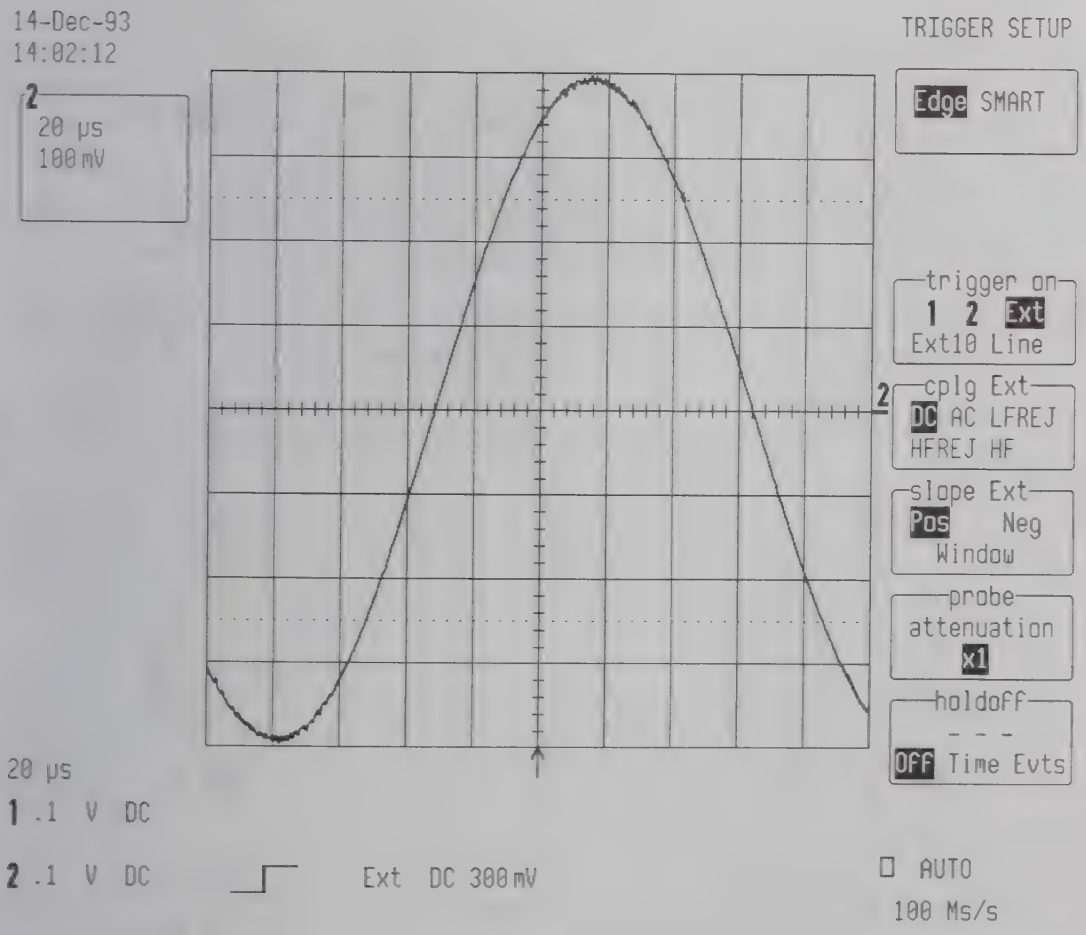
- Set Slope Ext : **Neg**

- Check : The sine wave must pass through the **horizontal center** of the screen (50 % pretrigger line) at the **vertical position zero** (vertical center) within **± 3 minor** vertical divisions.

- Repeat the test for the following conditions :

- Trigger level : **DC + 0.3 V**
- Slope Ext : **Pos**

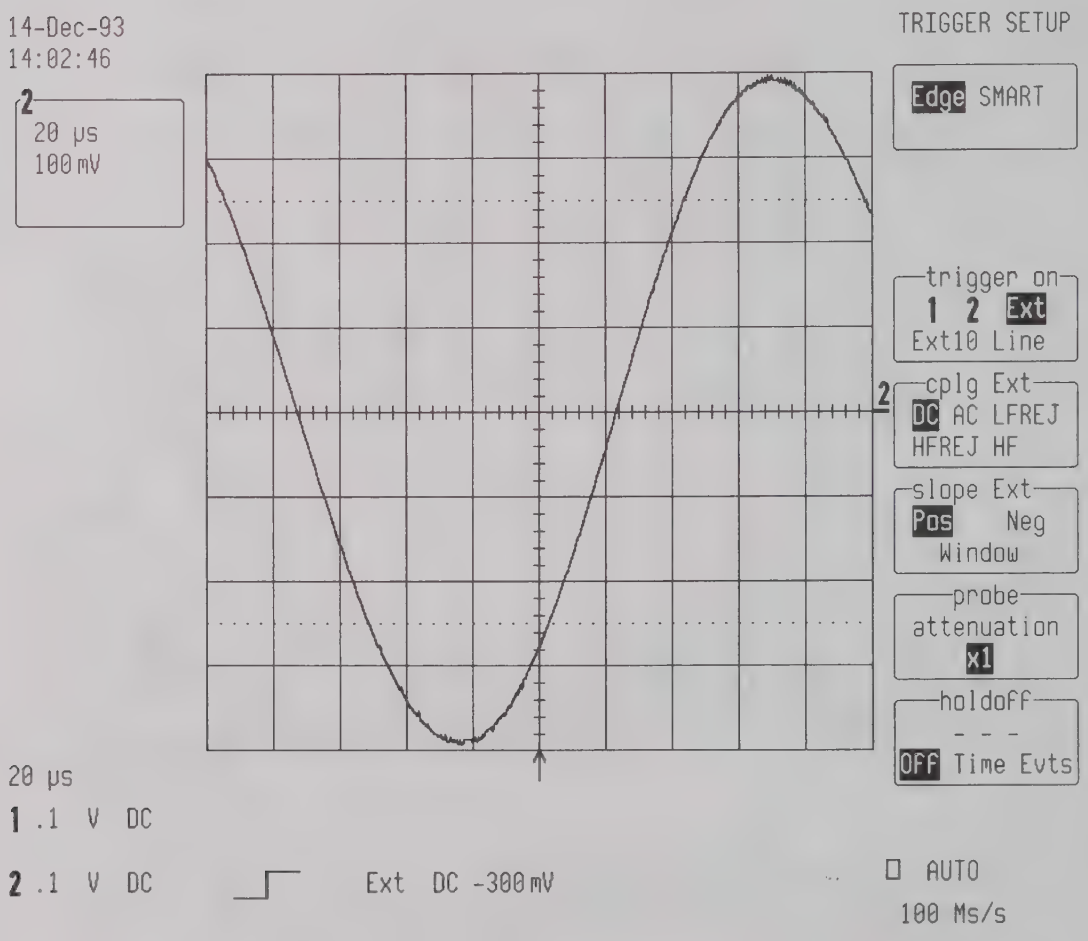
- Check : The sine wave must pass the horizontal center at **+ 3 divisions** within **± 3 minor** vertical divisions.



- Set Slope Ext : **Neg**

- Check : The sine wave must pass the horizontal center at **+ 3 divisions** within **± 3 minor** vertical divisions.

- Repeat the test for the following conditions :
- Trigger level : **DC - .3 V**
- Slope Ext : **Pos**
- Check : The sine wave must pass the horizontal center at **- 3 divisions** within ± **3 minor** vertical divisions.



- Set Slope Ext : **Neg**
- Check : The sine wave must pass the horizontal center at **- 3 divisions** within ± **3 minor** vertical divisions.

5.10.3 External /10 Trigger

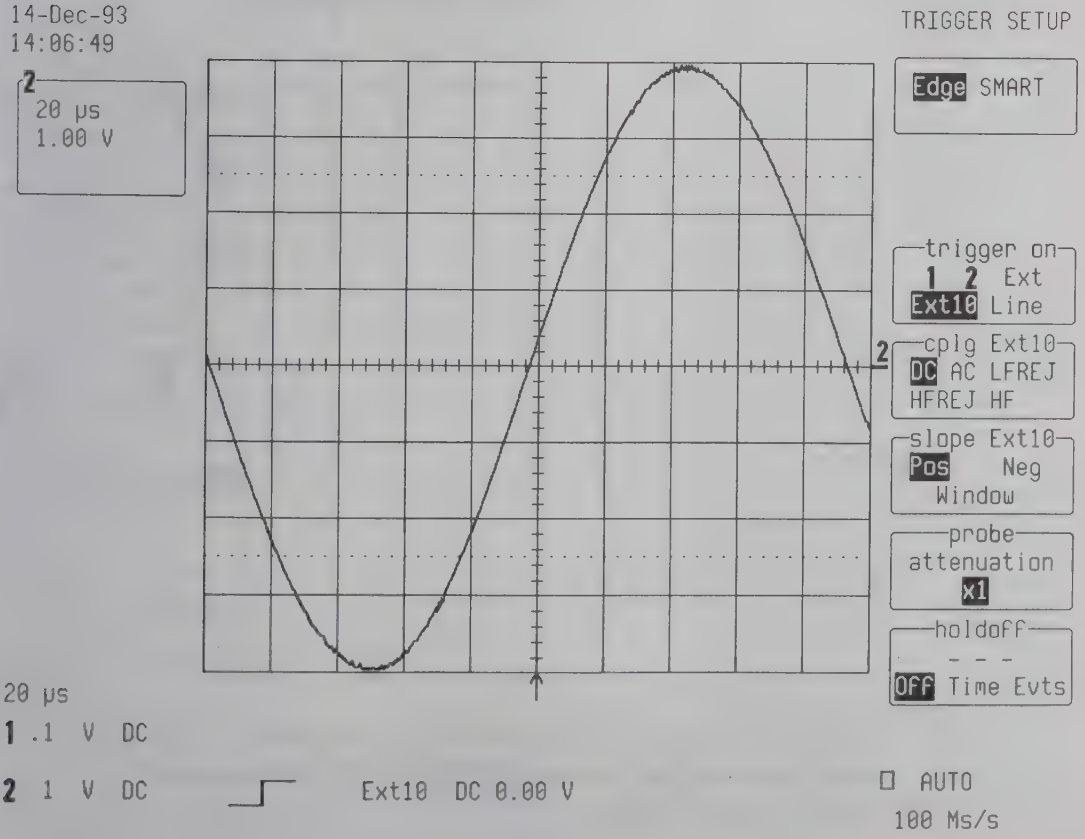
Specifications

External /10 voltage range : DC ± 5 V

- Set DSO as follows :
- Input gain : **1 V/div**
- Input offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **Ext/10**
- Coupling Ext/10 : **DC**
- Slope Ext/10 : **Pos**
- Ext/10 Trig level : **DC 0.0 mV**

- Adjust the sine wave generator's output amplitude to get **8 divisions** peak to peak, corresponding to a **4 V** amplitude. It is important that the offset of the input is set to **zero mV**, use show status and acquisition status to verify.

- Check : The sine wave must pass through the **horizontal center** of the screen (50 % pretrigger line) at the **vertical position zero** (vertical center) within **± 3 minor** vertical divisions.



Set Slope Ext/10 : **Neg**

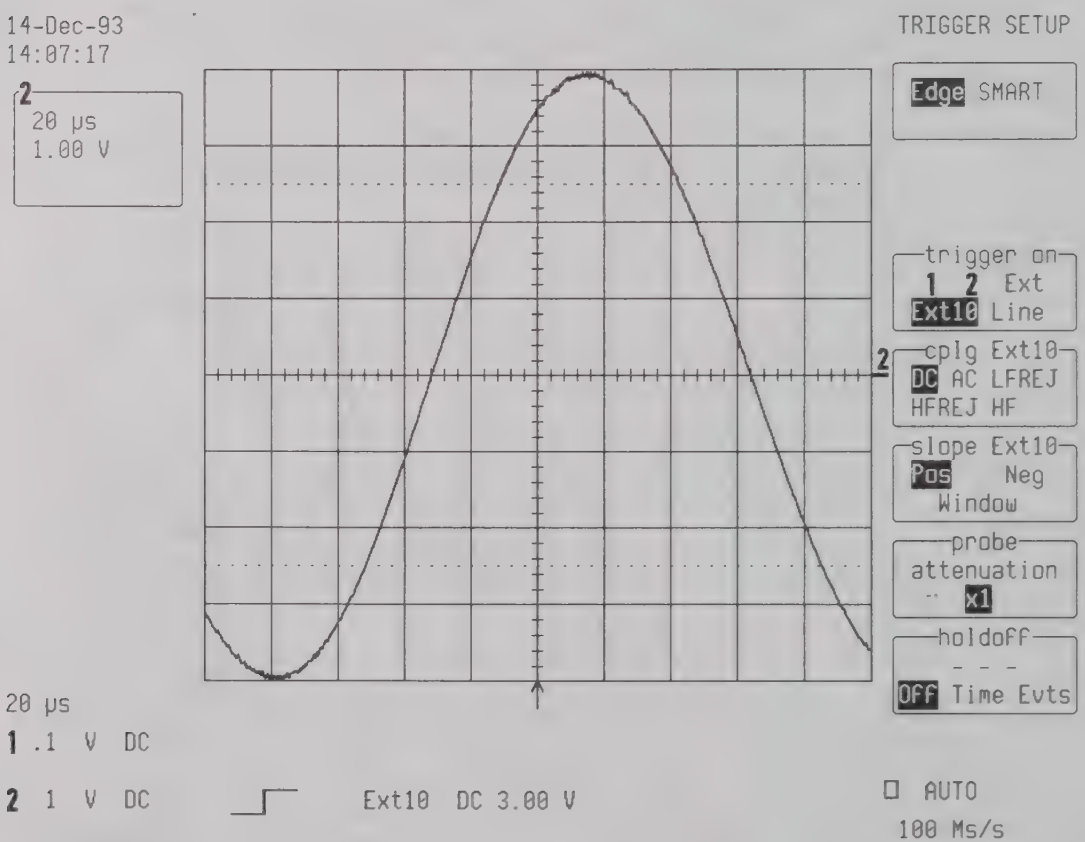
- Check : The sine wave must pass through the **horizontal center** of the screen (50 % pretrigger line) at the **vertical position zero** (vertical center) within **± 3 minor** vertical divisions.

- Repeat the test for the following conditions :

- Ext/10 Trig level : **DC + 3 V**

- Slope Ext/10 : **Pos**

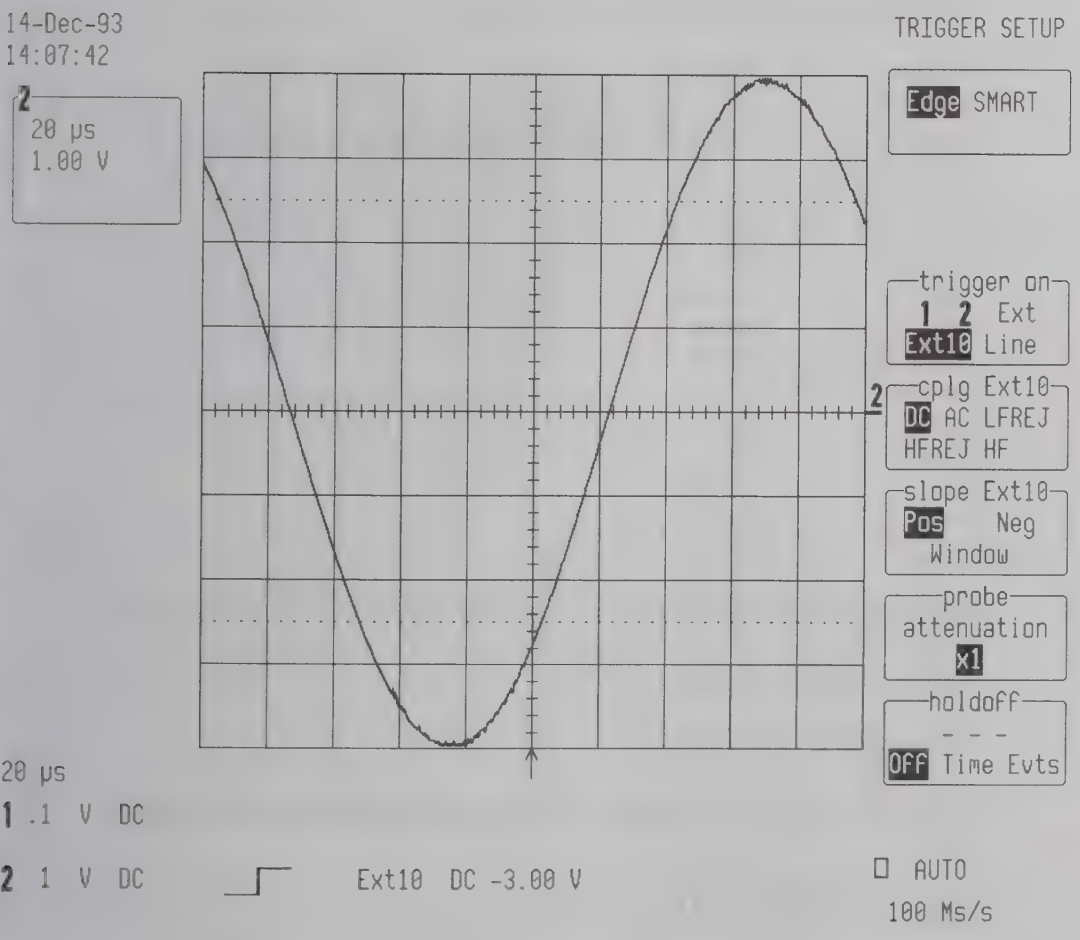
- Check : The sine wave must pass the **horizontal center** at **+ 3 divisions** within **± 3 minor** vertical divisions.



- Set Slope Ext/10 : Neg

- Check : The sine wave must pass the **horizontal center** at **+ 3 divisions** within **± 3 minor** vertical divisions.

- Repeat the test for the following conditions :
- Ext/10 Trig level : **DC - 3 V**
- Slope Ext/10 : **Pos**
- Check : The sine wave must pass the **horizontal center** at **- 3 divisions** within ± **3 minor** vertical divisions.



- Set Slope Ext/10 : **Neg**
- Check : The sine wave must pass the **horizontal center** at **- 3 divisions** within ± 3 minor **vertical divisions.**

5.11 Smart Trigger

Specifications

Pulse width < or > 2.5 nsec to 20 sec.

5.11.1 Trigger on Pulse Width < 10 nsec

Procedure

- Connect a leveled sine wave generator to Channel 1

- Frequency : **100 MHz**
- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input gain : **.5 V/div.**
- Trigger setup : **Smart**
- Setup Smart Trig : **Glitch**
- Trigger on : **1**
- Coupling 1 : **DC**
- At end of : **Neg**
- Width : **< 10 nsec**
- Mode : **Norm**
- Timebase : **5 nsec/div.**

- Adjust the generator output amplitude to get a **five division** amplitude sine wave.

- Check that the scope triggers

- Switch to Width : **> 10 nsec**

- Check that the scope **doesn't trigger** : slow trigger and no flashes in box next to normal.

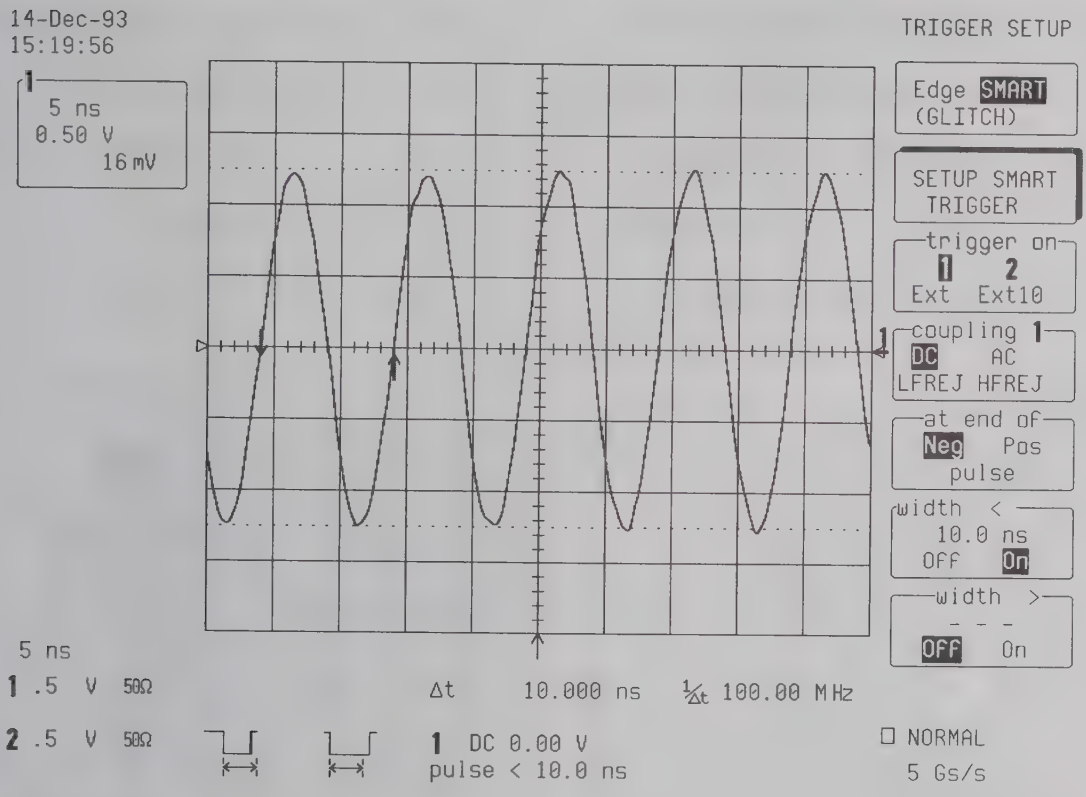
5.11.2 Trigger on Pulse Width > 10 nsec

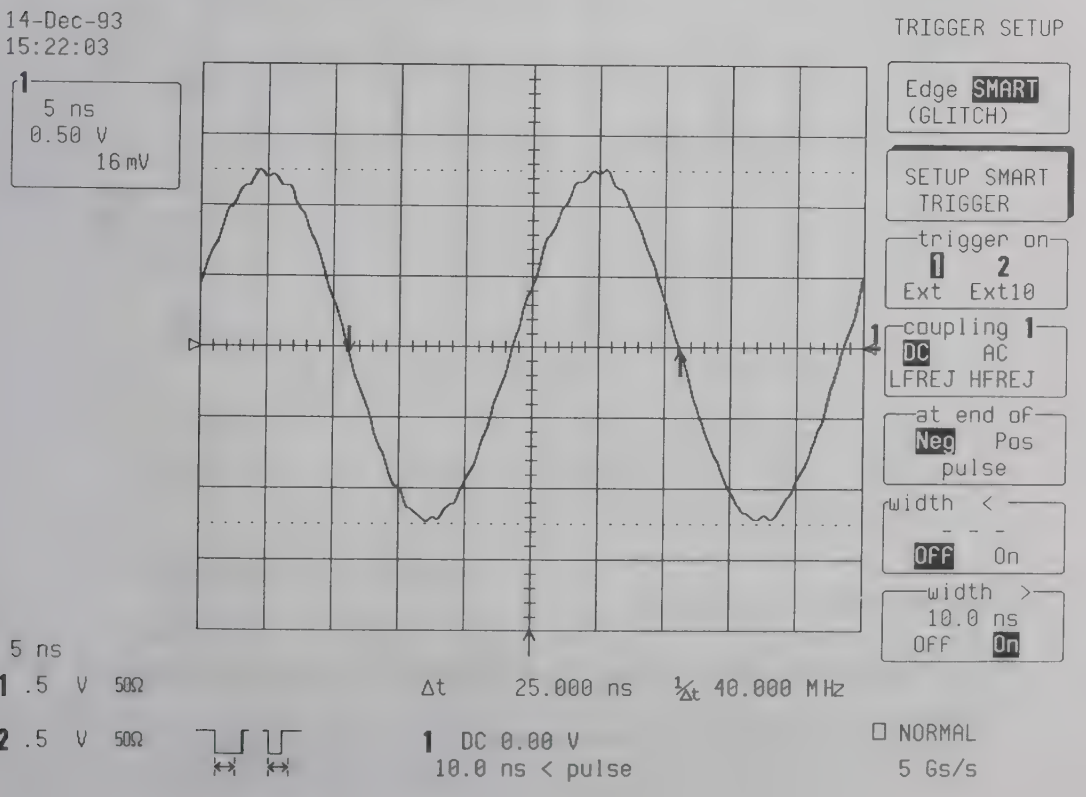
- Adjust the generator frequency to **40 MHz**

- Check that the scope triggers

- Switch to Width : **< 10 nsec**

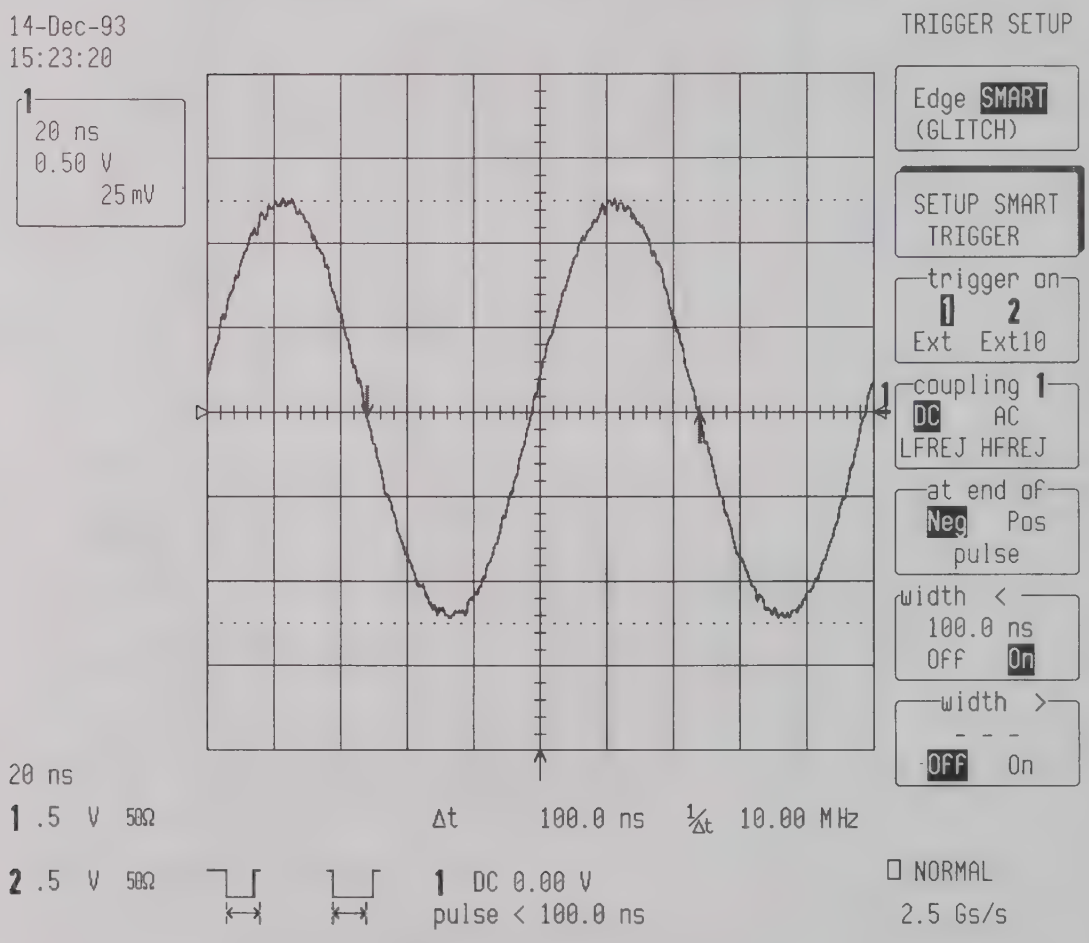
- Check that the scope **doesn't trigger** : slow trigger and no flashes in box next to normal.


14-Dec-93
15:19:56
1
5 ns
0.50 V
16 mV
TRIGGER SETUP
Edge SMART
(GLITCH)
SETUP SMART
TRIGGER
trigger on
1 2
Ext Ext10
coupling 1
DC AC
LFREJ HFREJ
at end of
Neg Pos
pulse
width <
10.0 ns
OFF On
width >
OFF On
5 ns
1 .5 V 50Ω
2 .5 V 50Ω
Δt 10.000 ns 1/Δt 100.00 MHz
1 DC 0.00 V
pulse < 10.0 ns
NORMAL
5 Gs/s


14-Dec-93
15:22:03
1
5 ns
0.50 V
16 mV
TRIGGER SETUP
Edge SMART
(GLITCH)
SETUP SMART
TRIGGER
trigger on
1 2
Ext Ext10
coupling 1
DC AC
LFREJ HFREJ
at end of
Neg Pos
pulse
width <
OFF On
width >
10.0 ns
OFF On
5 ns
1 .5 V 50Ω
2 .5 V 50Ω
Δt 25.000 ns 1/Δt 40.000 MHz
1 DC 0.00 V
10.0 ns < pulse
NORMAL
5 Gs/s

5.11.3 Trigger on Pulse Width < 100 nsec

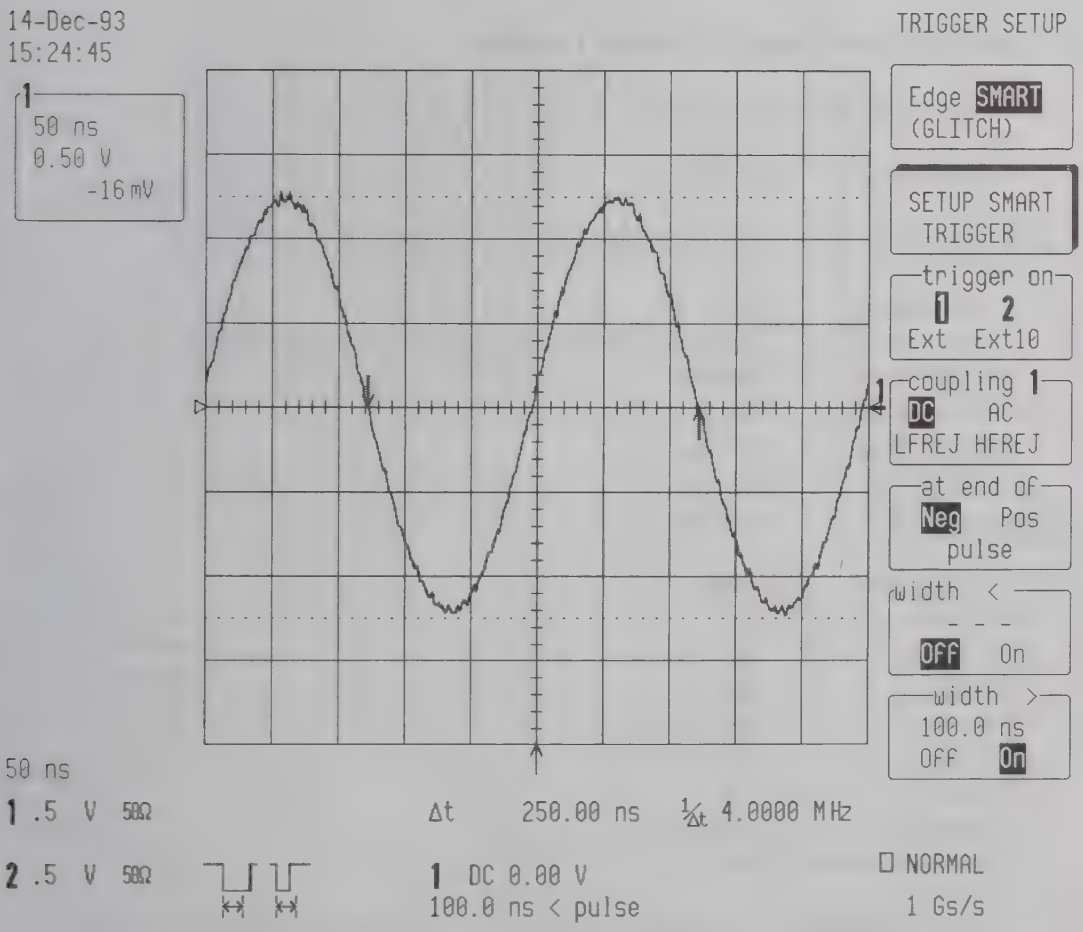
- Set the generator frequency to **10 MHz**
- Pulse width : **< 100 nsec**
- Timebase : **20 nsec/div**
- Check that the scope triggers.



- Switch to Width : > **100 nsec**
- Check that the scope **doesn't trigger** : slow trigger and no flashes in box next to normal.

5.11.4 Trigger on Pulse Width > 100 nsec

- Adjust the generator frequency to **4 MHz**
- Pulse width : > **100 nsec**
- Set Timebase : **50 nsec/div**
- Check that the scope triggers.



- Switch to Width : < **100 nsec**
- Check that the scope **doesn't trigger** : slow trigger and no flashes in box next to normal.
- Repeat all the above tests for Channel 2, substituting channel controls and input connector, and check as above.

5.12 Time Base Accuracy

Specifications

100 MHz clock : accuracy : ≤ ± 0.002 % or ≤ ± 20 ppm
833 MHz clock : accuracy : ≤ ± 0.07 % or ≤ ± 700 ppm

Description

An external sine wave generator of **1 MHz** with a frequency accuracy better than ± 0.001 % (1 ppm) is used.

5.12.1 100 MHZ Clock Manual Verification Procedure

Setup a leveled sine wave generator.

- Frequency : **1 MHz**

- Connect the generator output to Channel 1

- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Channel 1 : **Normal**
- Coupling Ch 1 : **DC 50 Ω**
- V/div. offset : **Normal**
- Probe atten : **X1**
- Input gain : **.5 V/div**

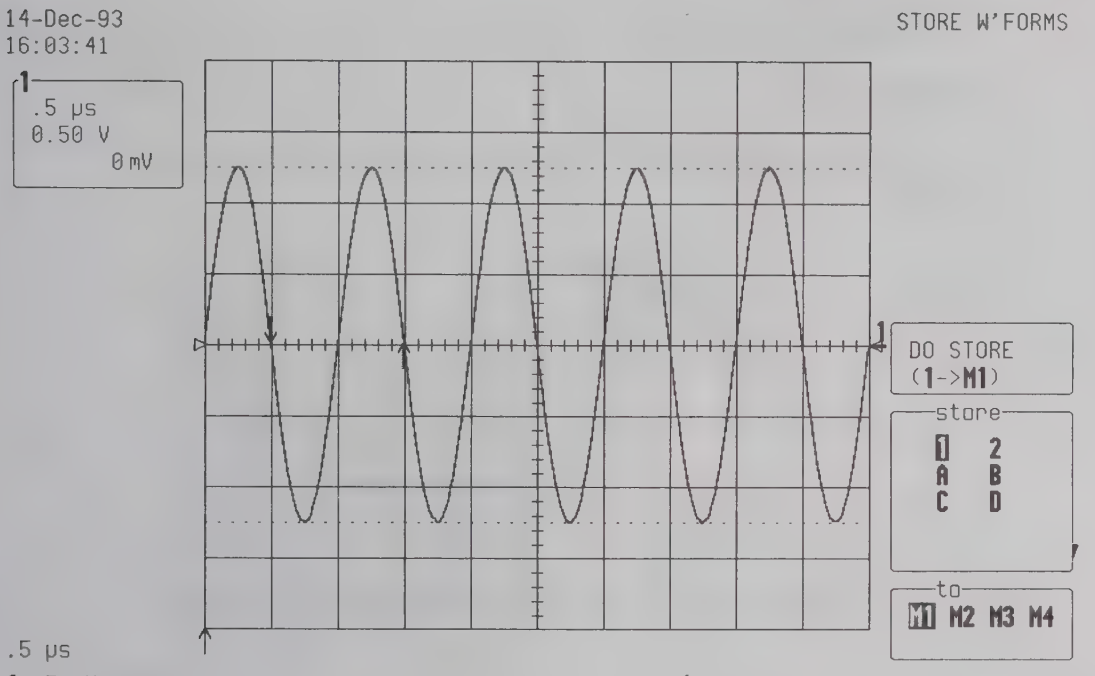
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Norm**
- Holdoff : **Off**
- Delay : **0 %**
- Timebase : **.5 µsec/div**
- Cursors/Measure : **Off**

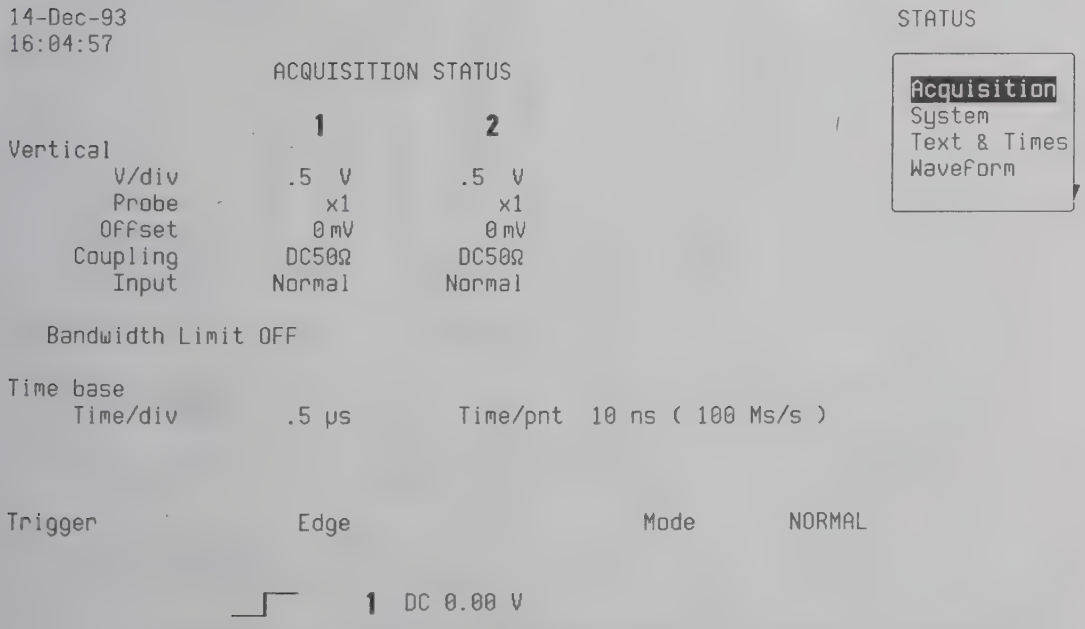
- Adjust the generator output amplitude and Ch1 offset to get a **five divisions** peak to peak amplitude sine wave.

- Store **Channel 1 in memory 1**

- Set Post-trigger delay to **1.00000 msec**

- This allows the **accuracy** of the time base **clock** to be checked **1000 periods** after the trigger point.


14-Dec-93
16:03:41
STORE W'FORMS
1
.5 µs
0.50 V
0 mV
DO STORE
(1->M1)
store
1 2
A B
C D
to
M1 M2 M3 M4
.5 µs
1 .5 V 50Ω
Δt 1.0000 µs 1/Δt 1.0000 MHz
2 .5 V 50Ω
1 DC 0.00 V
NORMAL
100 Ms/s


14-Dec-93
16:04:57
STATUS
ACQUISITION STATUS
Acquisition
System
Text & Times
Waveform
1 2
Vertical
V/div .5 V .5 V
Probe x1 x1
Offset 0 mV 0 mV
Coupling DC50Ω DC50Ω
Input Normal Normal
Bandwidth Limit OFF
Time base
Time/div .5 µs Time/pnt 10 ns (100 Ms/s)
Trigger Edge Mode NORMAL
1 DC 0.00 V
Post-trigger Delay 1000.00 µs
The currently preselected Smart Trigger type is
GLITCH
NORMAL
100 Ms/s

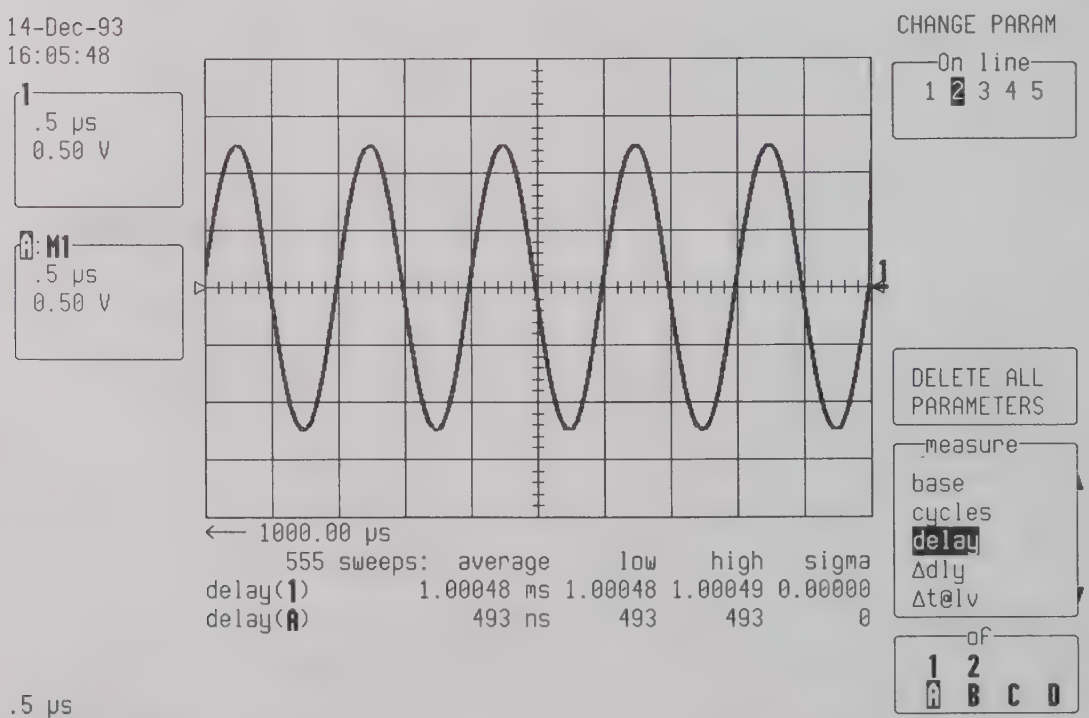
- Recall **memory 1** to **A**
- Turn on trace **A**
- Check that the displayed Channel 1 trace is **aligned** with the sine wave from memory **1**.

- Press : **Cursors/Measure**
- Measure : **Parameters**
- Mode : **Custom**
- Statistics : **On**

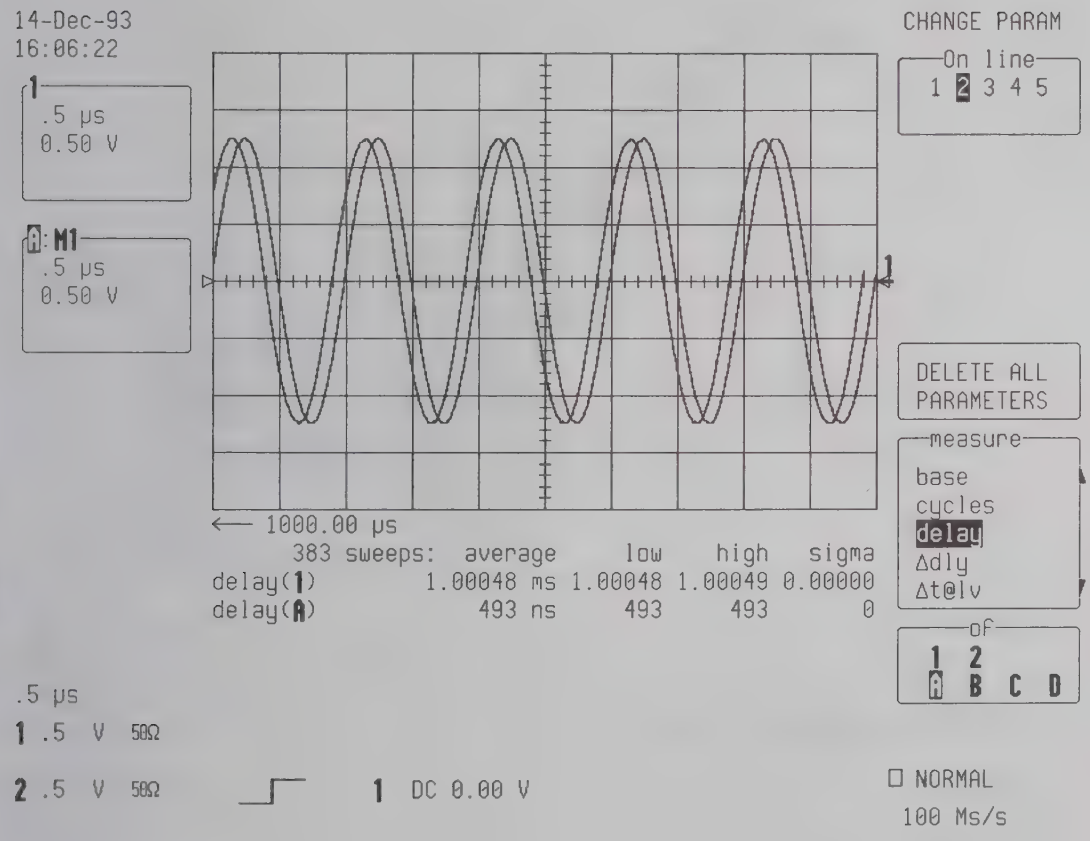
- Change parameters

- On line 1 : **Delay of 1**
- On line 2 : **Delay of A**

Check that (**delay(A) - delay(1) + 1 msec**) ≤ ± **0.00002** msec corresponding to **20 ppm.**



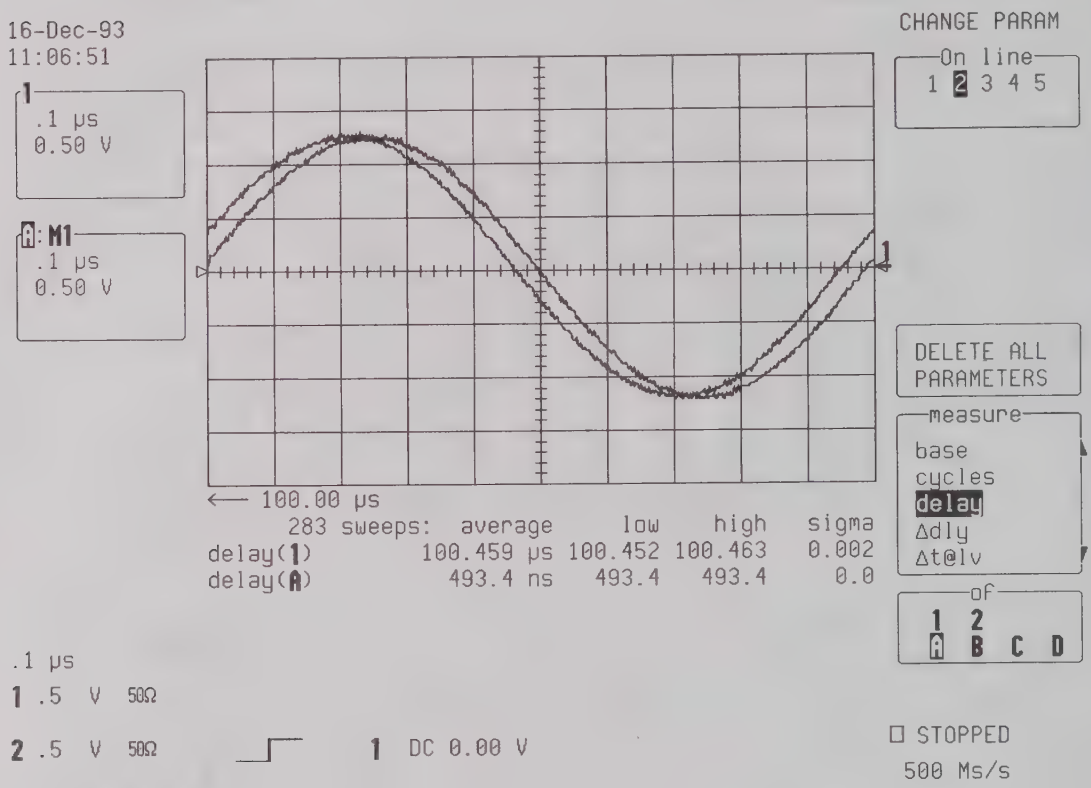
- A difference of ± **0.02 µsec** corresponds to ± **20 ppm**.
- See screen dump below :



5.12.2 833 MHZ Clock Manual Verification Procedure

- Repeat step 5.12.1 with :
- Timebase : **.1 µsec/div**
- Store **Channel 1** in **memory 1**
- Set Post-trigger delay to **100 µsec**
- This allows the **accuracy** of the time base **833 MHz clock** to be checked **100 periods** after the trigger point.
- Recall memory **1** to **A**

- Check that (**delay(A) - delay(1) + 1 msec**) ≤ ± **0.0007 msec** corresponding to **700 ppm**.



5.13 300 MHz Normal Inputs Overshoot

Specification

Overshoot < 8 %

Procedure

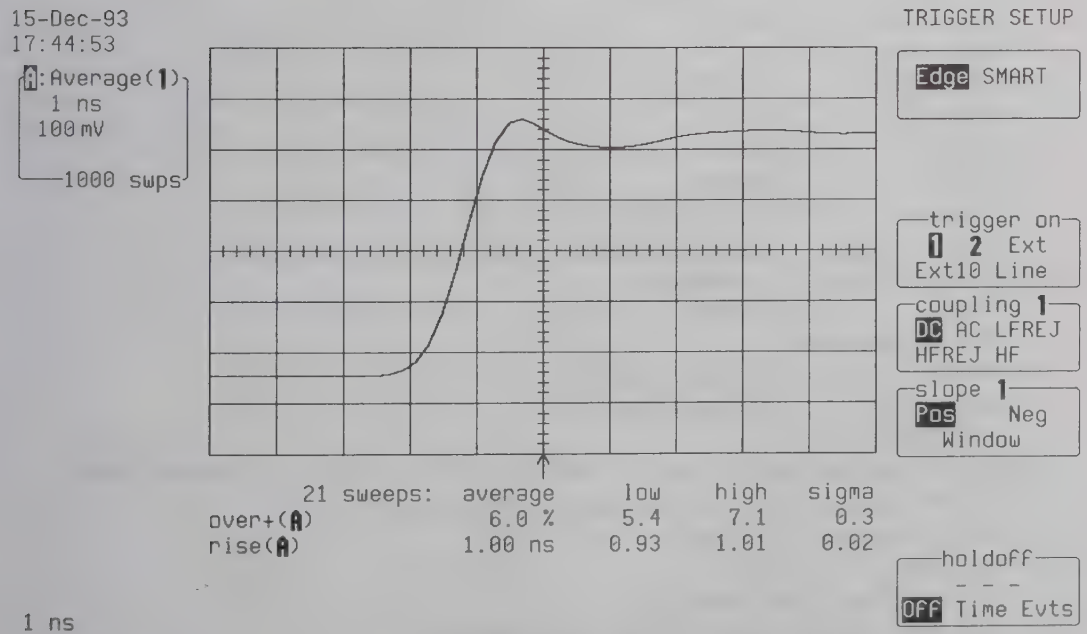
The probe calibrator with a frequency of 2 MHz is applied to Channel 1.

- Using a **5 nsec BNC** cable connect the probe calibrator output to Channel 1 (9360 and 9361 300 MHz normal inputs).

- Select : **Utilities**
- Press : **Cal BNC Setup**
- Mode : **Cal signal**
- Shape : **Square**
- Amplitude : **1 V into 1MΩ**
- Set Frequency : **2 MHz**
- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**

- Input Channel 1 : **Normal**
- Coupling Ch 1 : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input offset : **- 250 mV**
- Input gain : **100 mV/div**
- Trigger setup : **Edge**
- Trigger on : **1**
- Trigger level : **DC 250 mV**
- Coupling 1 : **DC**
- Slope 1 : **Neg**
- Mode : **Normal**
- Timebase : **1 nsec/div**
- Delay : **50 % Pre-Trigger**
- Cursors/Measure : **Parameters**
- Mode : **Custom**
- Statistics : **On**
- Change Parameters :
- On line 1 : **Over + of Channel 1**

- Check that the Overshoot is < **8 %**



- Repeat the test for Channel 2.

5.14 Probe Calibrator Verification

Specifications

Amplitude : 50 mV to 500 mV ± **2 %** into 50Ω
: 50 mV to 1 V ± **2 %** into 1 MΩ

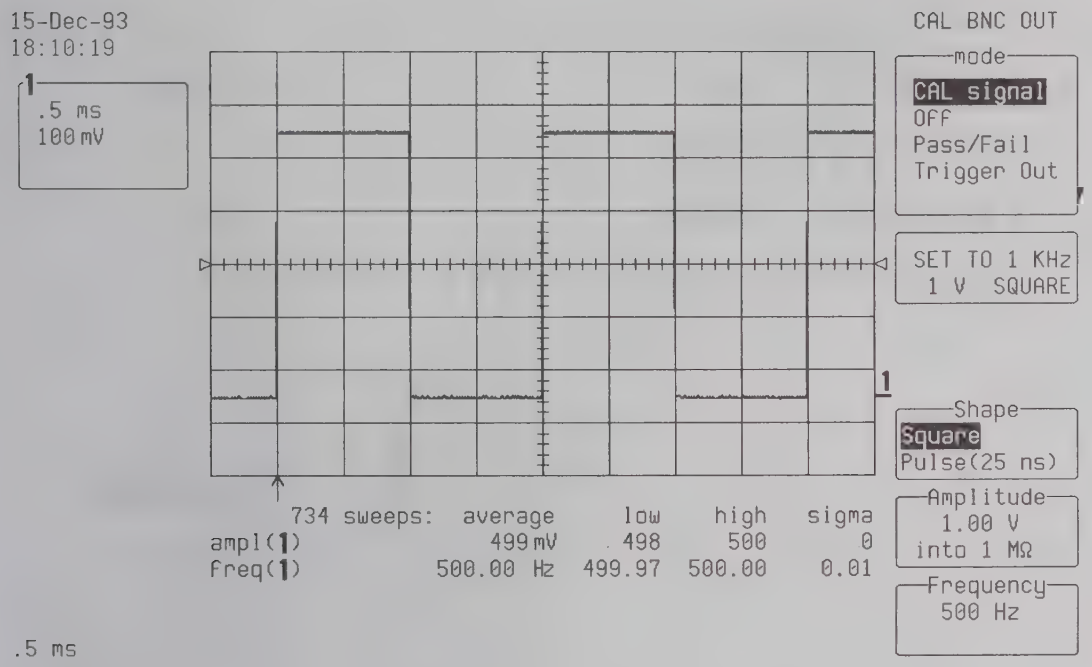
Frequency : 500 Hz to 2 MHz ± 1 ‰

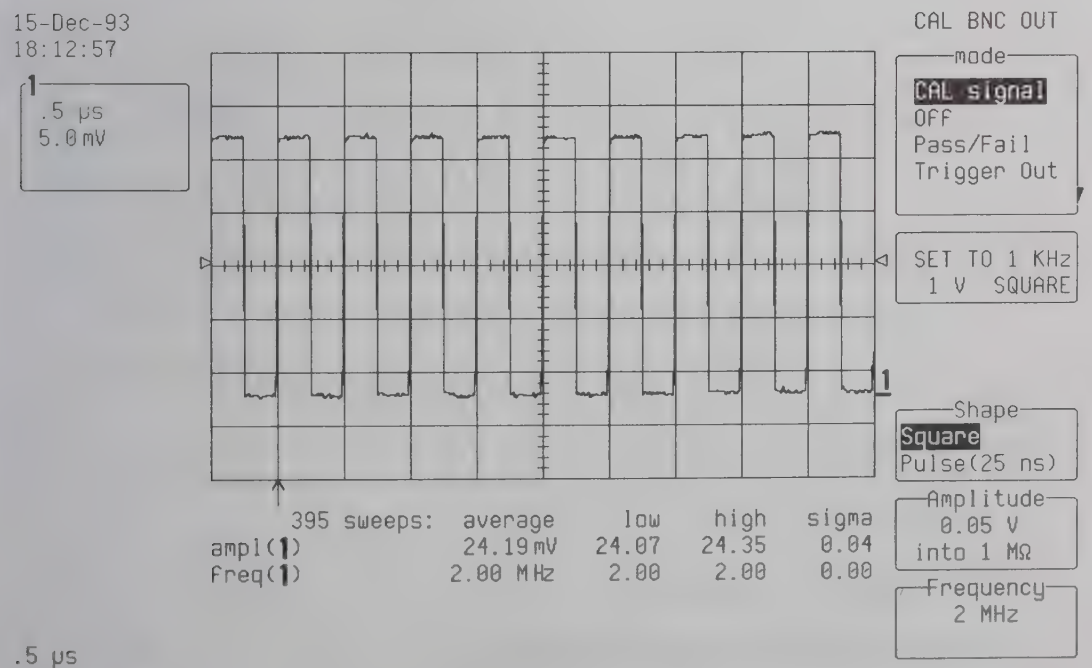
Probe Calibrator Verification Procedure

- Connect the Probe Calibrator output to Channel 1, using a 5 nsec BNC cable
- Select : **Utilities**
- Press : **Cal BNC Setup**
- Mode : **Cal signal**
- Set Frequency : **500 Hz**
- Amplitude : **1 V (500 mV into 50 Ω)**
- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input : **Normal**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Probe atten : **X1**
- Input offset : **- 250 mV**
- Input gain : **100 mV/div.**
- Trigger setup : **Edge**
- Trigger on : **1**
- Trigger level : **DC 250 mV**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Normal**
- Timebase : **.5 msec/div.**
- Delay : **10 % Pre-Trigger**
- Cursors/Measure : **Parameters**
- Mode : **Custom**
- Change parameters :
- On line 1 : **Measure ampl of 1**
- On line 2 : **Measure freq of 1**

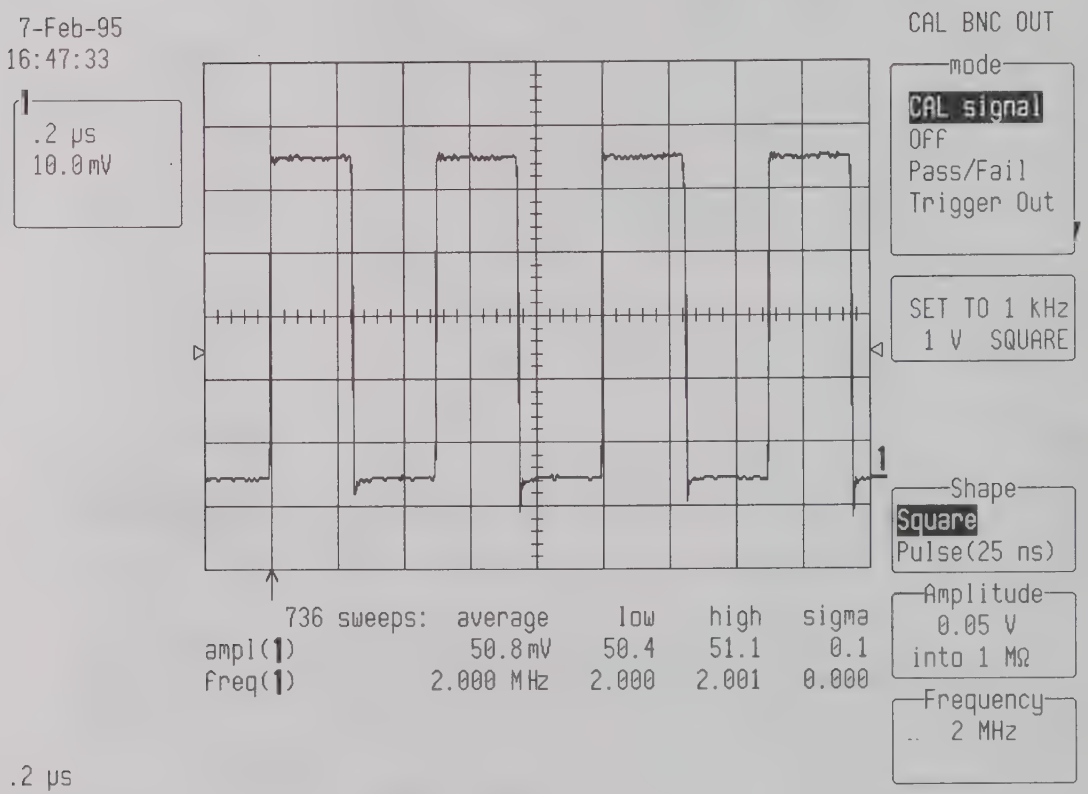
- Check parameters readout : freq (1) = **500 Hz** ± 1 ‰ , and ampl (1) = **500 mV ± 6 %** (± **2 %** plus ± 4 % due to the non linearity of the scope)
- Set Cal frequency : **2 MHz**
- Timebase : **.2 µs**
- Check that freq (1) is **2 MHz** ± 1 ‰
- Repeat test for amplitude of **0.05 V** (25 mV into 50 Ω)
- Set Cal amplitude : **50 mV** (25 mV into 50 Ω)
- DSO Input gain : **5 mV/div.**

- Check parameters readout ampl (1) = **25 mV ± 6 %**


15-Dec-93
18:10:19
1
.5 ms
100 mV
CAL BNC OUT
mode
CAL signal
Off
Pass/Fail
Trigger Out
SET TO 1 KHz
1 V SQUARE
Shape
Square
Pulse(25 ns)
Amplitude
1.00 V
into 1 MΩ
Frequency
500 Hz
734 sweeps: average low high sigma
ampl(1) 499 mV 498 500 0
freq(1) 500.00 Hz 499.97 500.00 0.01
.5 ms
1 .1 V 50Ω
2 .1 V 50Ω
1 DC 250 mV
NORMAL
5 Ms/s


15-Dec-93
18:12:57
1
.5 µs
5.0 mV
CAL BNC OUT
mode
CAL signal
Off
Pass/Fail
Trigger Out
SET TO 1 KHz
1 V SQUARE
Shape
Square
Pulse(25 ns)
Amplitude
0.05 V
into 1 MΩ
Frequency
2 MHz
395 sweeps: average low high sigma
ampl(1) 24.19 mV 24.07 24.35 0.04
freq(1) 2.00 MHz 2.00 2.00 0.00
.5 µs
1 5 mV 50Ω
2 .1 V 50Ω
1 DC 12.6 mV
AUTO
100 Ms/s

- Repeat the tests for the amplitude of 0.05 V and 1 V into 1 MΩ
- Cal amplitude : **50 mV**
- Set Input Coupling : **DC 1M Ω**
- DSO Input gain : **10 mV/div.**
- Check parameters readout ampl (1) = **50 mV ± 6 %**



- Set Cal amplitude : **1 V**
- DSO Input gain : **200 mV/div.**
- Check parameters readout ampl (1) = **1 V ± 6 %**

5.15 Overload

Specifications

1 Watt into 50 Ω : Overload < 17 seconds

Procedure

- Set the DSO as follows :

- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input : **Normal**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input offset : **- 3.5 V**
- Input gain : **1 V/div.**
- Trigger setup : **Edge**
- Trigger on : **1**
- Trigger level : **DC - 0.04 V**
- Delay : **zero**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Norm**
- Holdoff : **Off**
- Timebase : **2 sec/div.**

- From Tektronix power supply PS5004, apply **7.07 V** (1 Watt) to Channel 1.

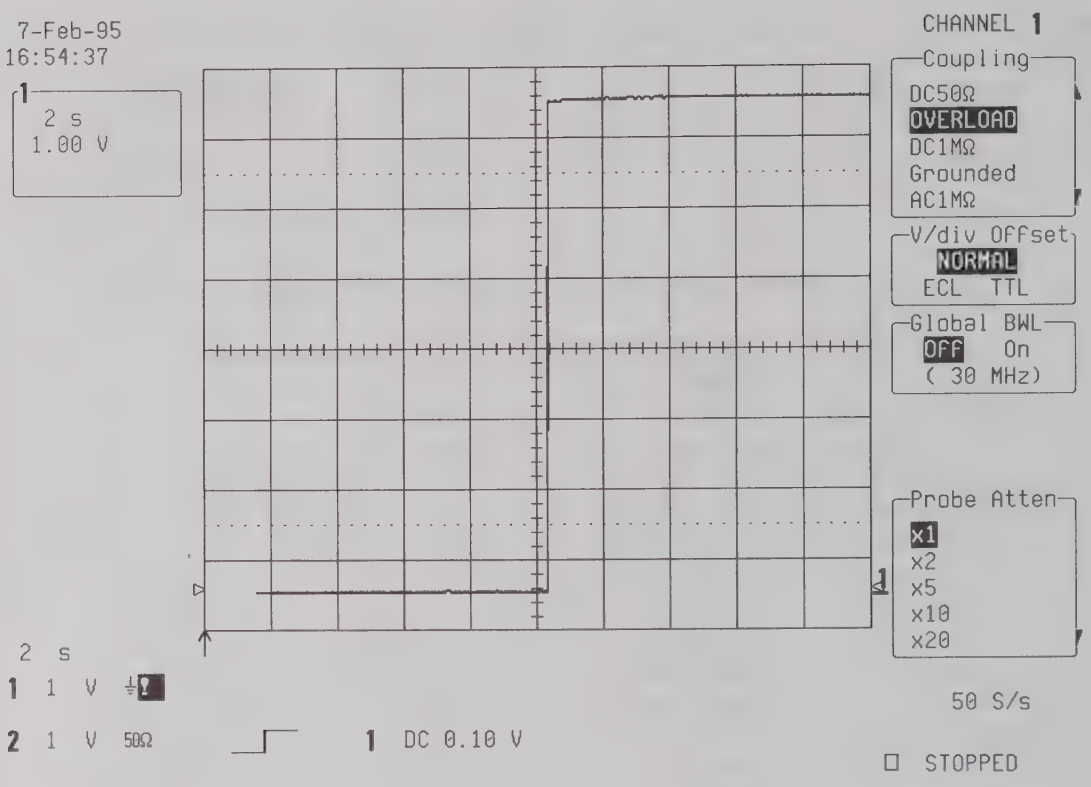
- Check that the overload trips, within **17** seconds.

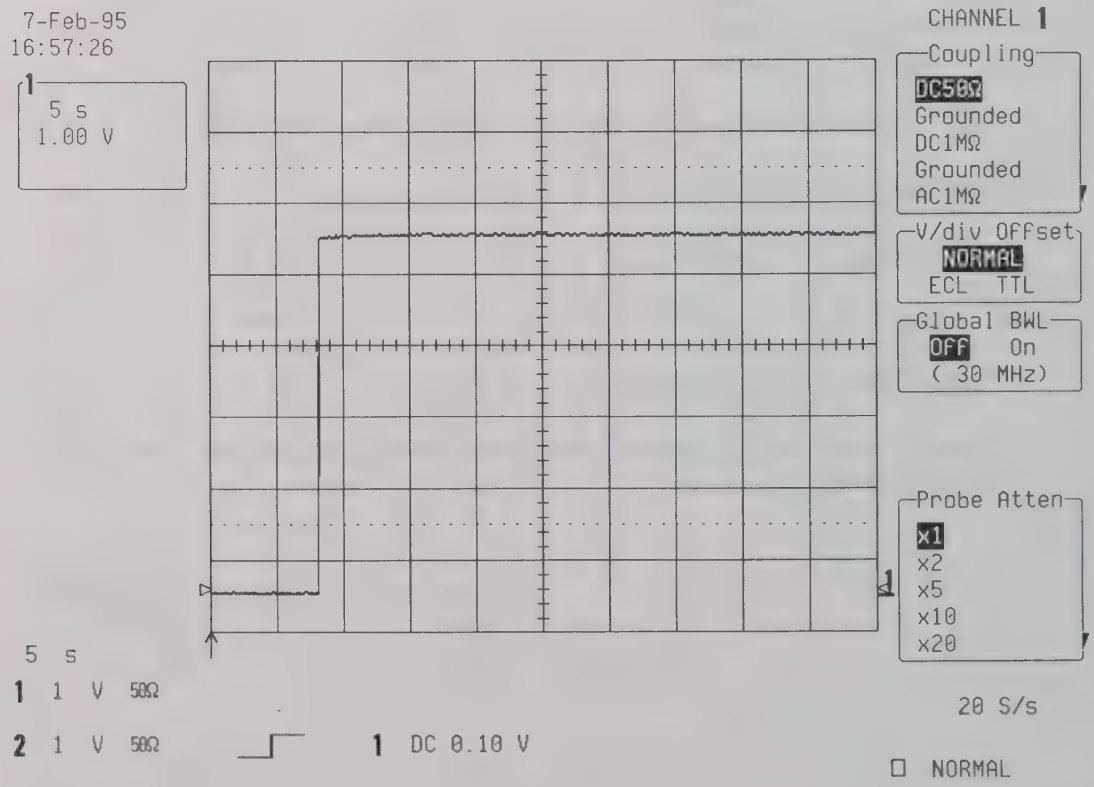
- Set Timebase : **5 sec/div.**

- From Tektronix power supply PS5004, apply **5 V** (.5 Watt) to Channel 1

- Check that the overload doesn't trip for at least **30** seconds.

- Repeat the above tests for Channel 2 substituting channel control and input connector, and check as above.


7-Feb-95
16:54:37
1
2 s
1.00 V
CHANNEL 1
Coupling
DC50Ω
OVERLOAD
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
2 s
1 1 V
2 1 V 50Ω
1 DC 0.10 V
50 S/s
STOPPED


7-Feb-95
16:57:26
1
5 s
1.00 V
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
5 s
1 1 V 50Ω
2 1 V 50Ω
1 DC 0.10 V
20 S/s
NORMAL

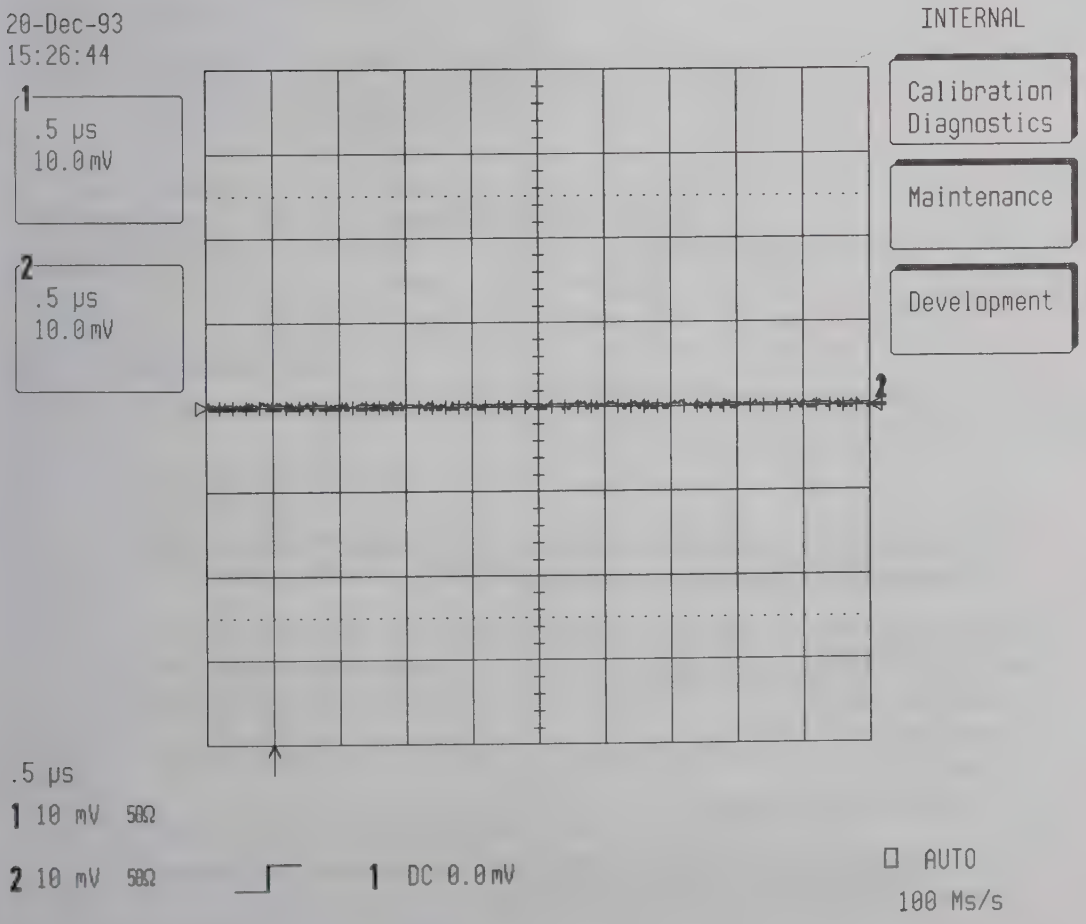
SECTION 6 INTERNAL CALIBRATION and DIAGNOSTICS

6.1 Introduction

- The 9360/61 internal calibration use routines to confirm basic functionality, no test equipment is required to do these test procedures. The **diagnostics menu** is entered by simultaneously depressing the **third** and **fourth** menu push buttons on the right hand side of the CRT and then by depressing the **fifth**.

- To quickly check the performance of the digital storage oscilloscope, select the **calibration diagnostics**.

- Press the **recalibrate completely** button to do a full recalibration of the front end. It is advisable to perform this type of check when the scope is in a stable condition.

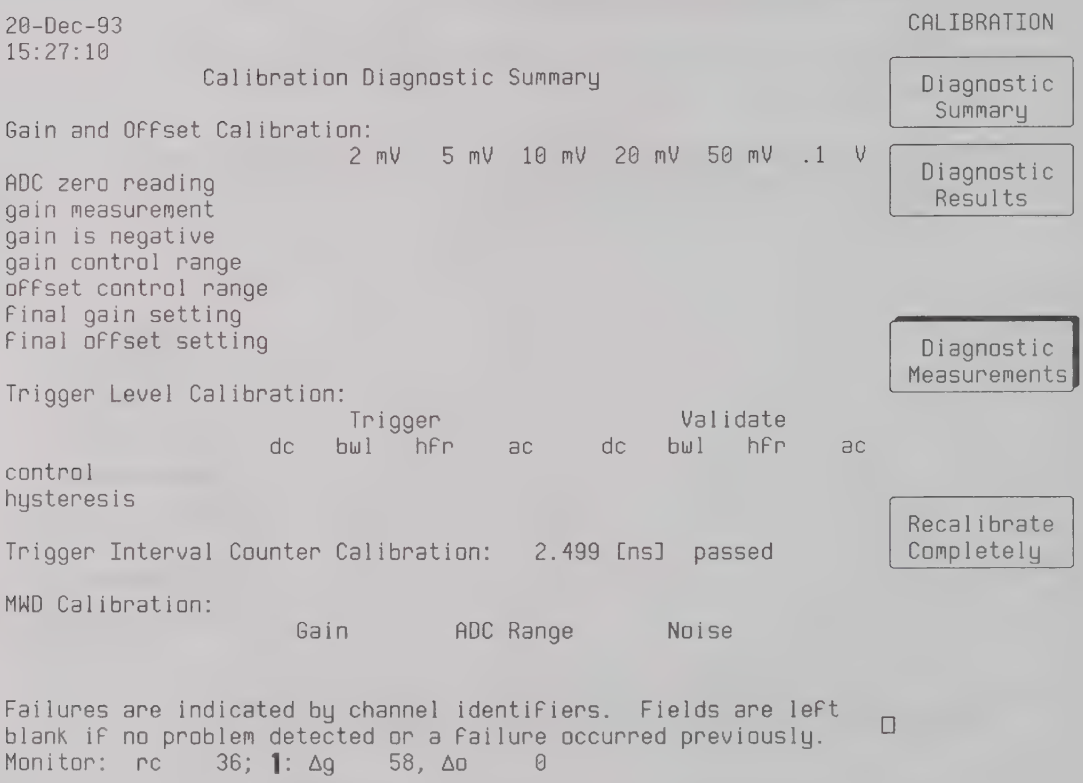


6.2 Diagnostic Summary

- Press **diagnostic summary**.

- This is a handy tool to perform a quick but comprehensive **internal performance** check, without touching the acquisition settings. The failures are indicated by channel identifiers.

- If no problem is detected, the fields are left **blank**.



- The **gain** and **offset** calibration results displayed for Channel 1 and Channel 2 are independent of the following conditions:

- Time base
- 50 Ω or 1 MΩ input impedance
- BWL on or off
- Variable gain
- Offset
- Trigger mode and coupling

- The internal calibration is checked at **DC 1 MΩ**, and for the **six gain** settings : 2 mV, 5 mV, 10 mV, 20 mV, 50 mV, .1 V/div.

6.2.1 Gain and Offset Calibration Description

- ADC zero reading : Failed to get 0 reading from ADC for some choice of Vgain, and Cal signal, while varying the Offset
- Gain measurement : Failed to measure Gain, the gain was not what was expected.
- Gain is negative : Measured a negative Gain or broken channel.
- Gain control range : The range of the variable Gain is checked.
- Offset control range : The range of the variable Offset is checked.
- Final gain setting : An error is detected if the variable Gain and fix Gain adjustment do not converge to the desired Gain.
- Final offset setting : An error is detected if the 3 Offset calibration points do not lie on a straight line.

6.2.2 Trigger Level Calibration

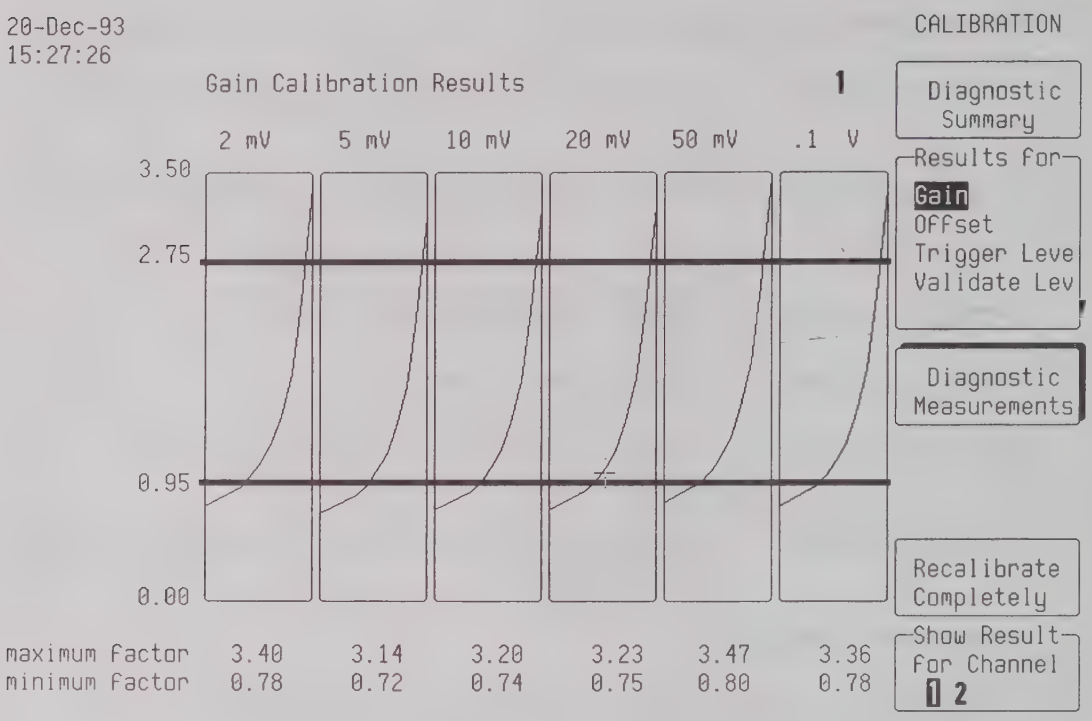
- The control of the trigger hysteresis is done in the trigger mode DC, BWL on, HFr, and AC. If an error has occurred 1, 2, or E is displayed corresponding to Channel 1, Channel 2, or External.
- Control : Failed if no transition of discriminator observed when stepping the Threshold level.
- Hysteresis : Failed to get correct Hysteresis.

6.3 Diagnostic Results

6.3.1 Gain Curves

- Press **diagnostic results**
- Select results for **gain**
- Press **recalibrate completely**
- Select show results for **Channel 1**

- Variable gain range, checked by software must be better than **0.95** to at least **2.75**. With regards to the illustration, the lower portion of the curve must extend below **0.95** limit, and the upper portion above the **2.75** limit.
- If this is not true the Gain control range summary shows a violation for Channel 1.
- The maximum and minimum gain factors are displayed.



- Repeat the test for Channel 2.

6.3.2 Offset Curves

- Select results for **Offset**, and show result for **Channel 1**

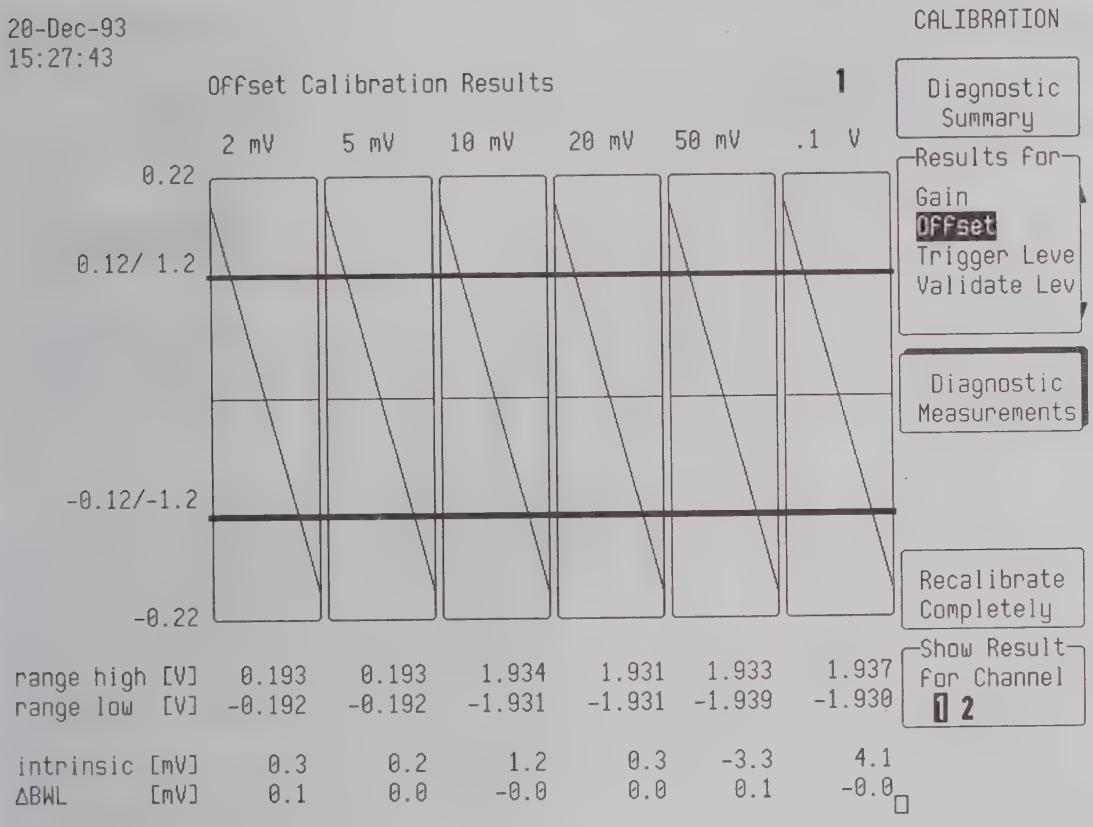
  X = offset DAC range
  Y = offset

- The curves should be above the positive limits **+ 0.12 V / + 1.2 V** and below the negative limits **- 0.12 V / - 1.2 V**.

- For the sensitivities 2 mV, 5 mV/div. a 1/10 attenuator is used, the limits are ± **0.12 V**.
- For the sensitivities 10 mV, 20 mV, 50 mV, 0.1 V/div. the limits are ± **1.2 V**.
- The maximum and minimum offset is ± 1.2 V. The calibration verifies that the DAC can reach this value.

- The intrinsic value represents the offset in mV that should be applied to get zero offset to the ADC.

  NB : ΔBWL is the difference between BWL on and BWL off.



- Repeat the test for Channel 2.

6.3.3 Trigger

6.3.3.1 Trigger Level Calibration

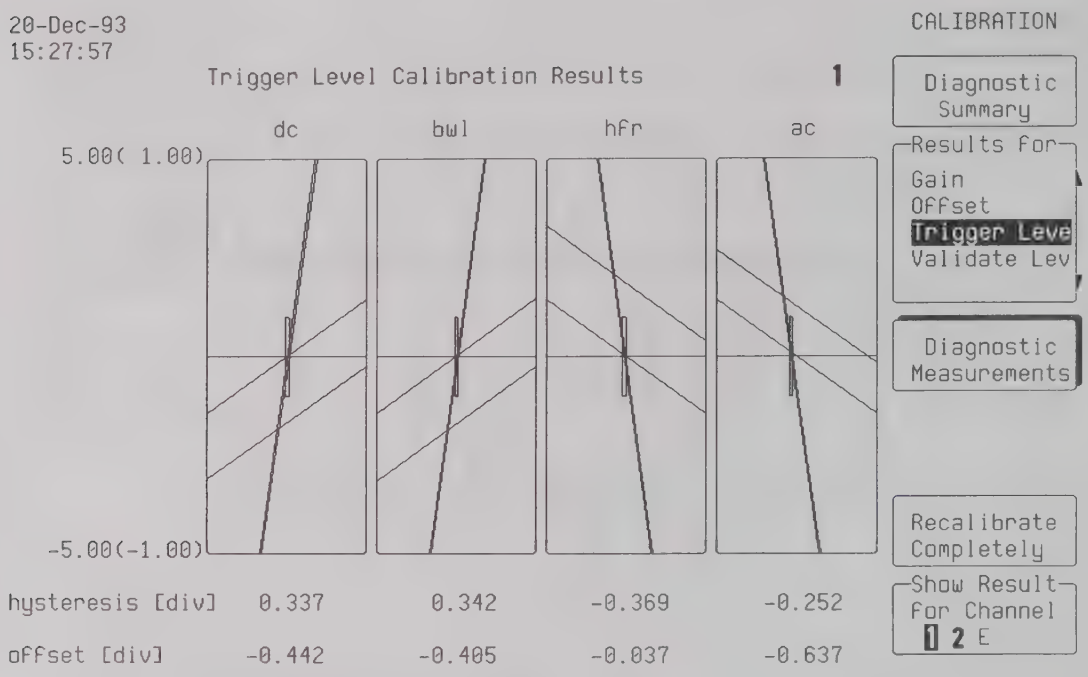
- Select results for **trigger level**

- For Channel 1 and Channel 2 the hysteresis value for trigger DC, BWL, HFR, AC is given in **divisions**. The trigger range is ± 5 div. for the steep curve. The boxed region is zoomed to give the two lines with a vertical scale of ± 1 div. The external trigger hysteresis is given in Volt. The offset of the positive curve relating trigger threshold to DAC setting is given.

- Press **recalibrate completely**
- Select show result for **Channel 1**

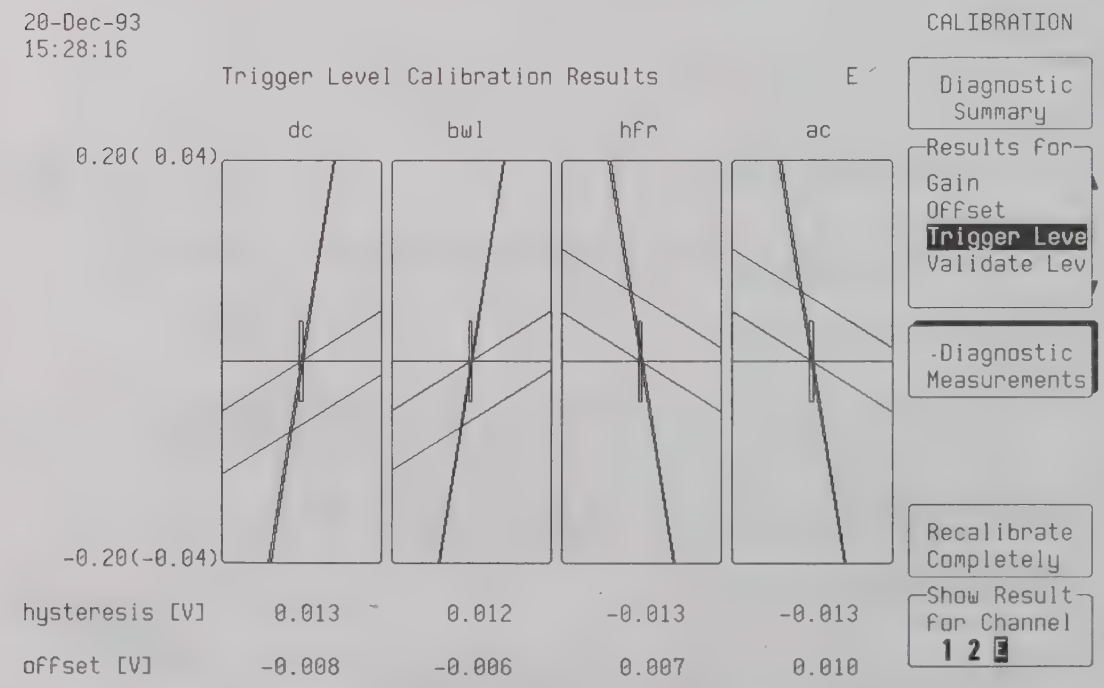
- The **DC** hysteresis in div. should be ± **0.35 div.** ± **0.05 div.**

- Repeat the test for Channel 2.



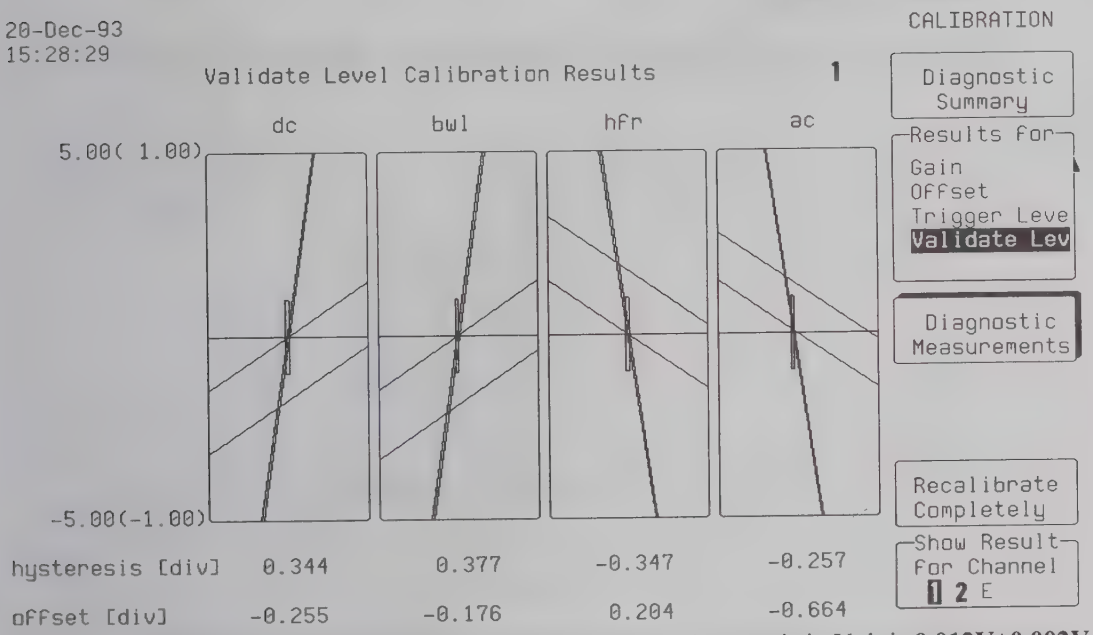
- Select show result for external trigger

- The hysteresis in Volt should be **0.012 V ± 0.002 V**

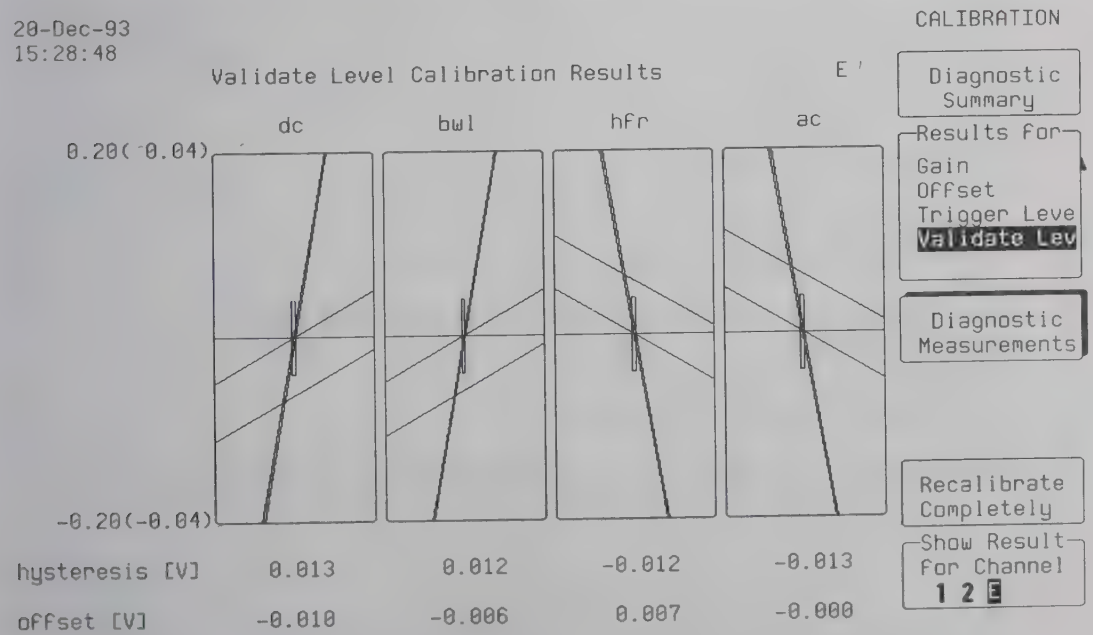


6.3.3.2 Validate Level Calibration

- Select results for **validate level** and press recalibrate completely.
- Select show result for Channel 1 and check the hysteresis in div should be : **0.35 ± 0.05**
- Repeat the test for Channel 2.



- Select show result for external trigger and check : hysteresis in Volt is **0.012V±0.002V**

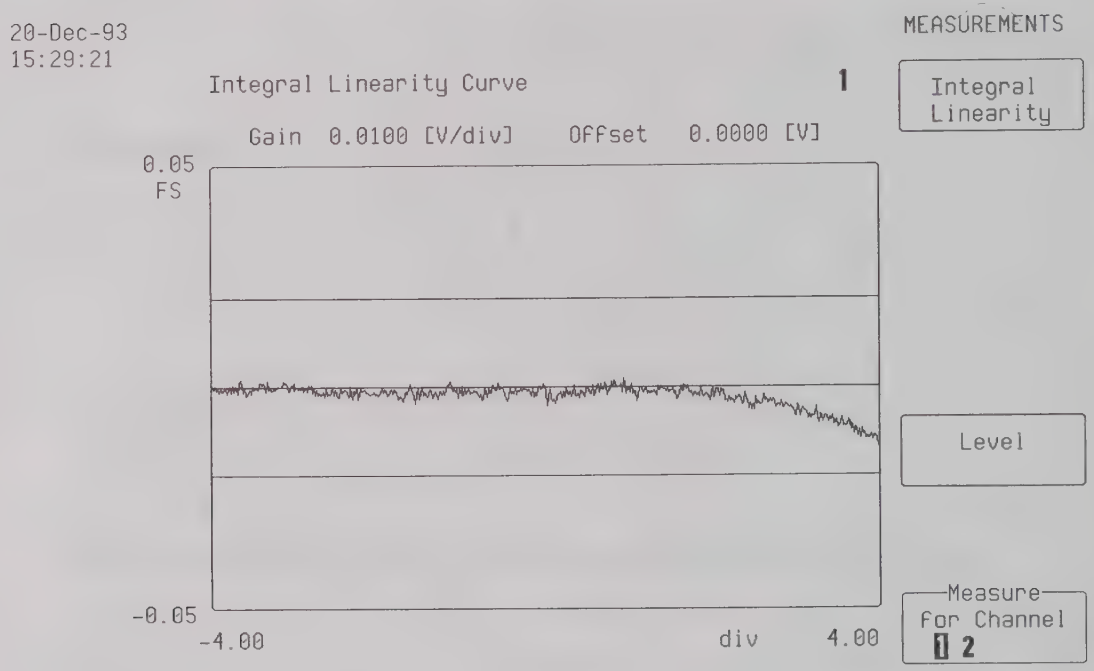


6.3.4 Integral Linearity

- Press **diagnostic measurements**

- Select **integral linearity**
- Measure for **Channel 1**

- The integral linearity curve should be within the ± **0.05 * FS** bars, for offset = 0.0 V.



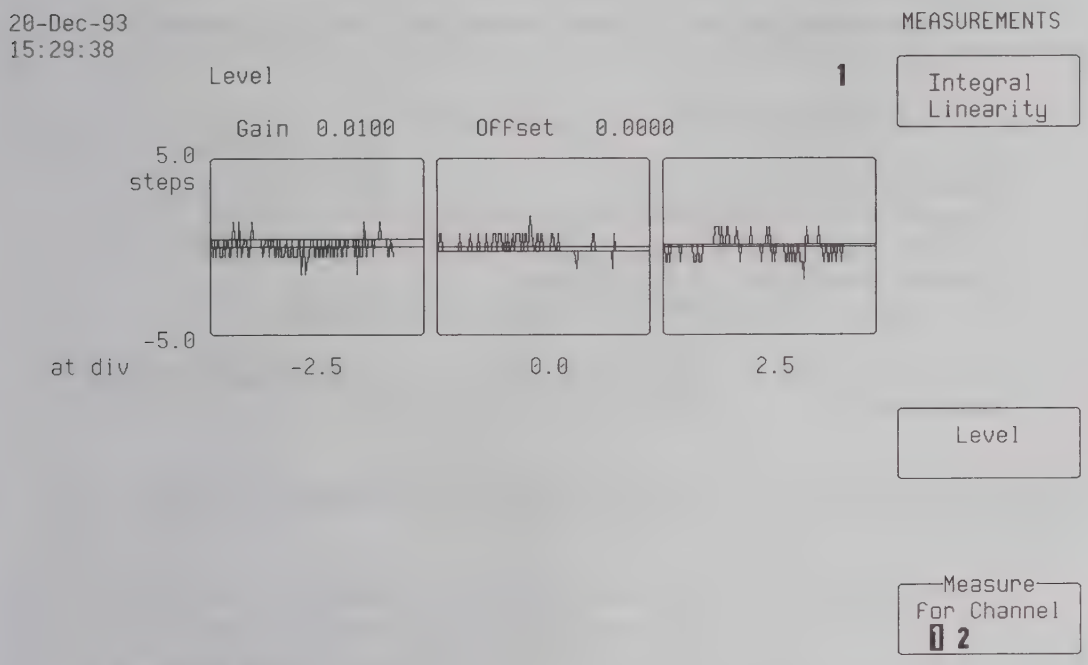
- Repeat the test for Channel 2.

- Press **level**
- Measure for **Channel 1**

- The three plots show raw ADC data displayed around their mean value for 3 different CAL levels.

- The data should be **narrow** and random.

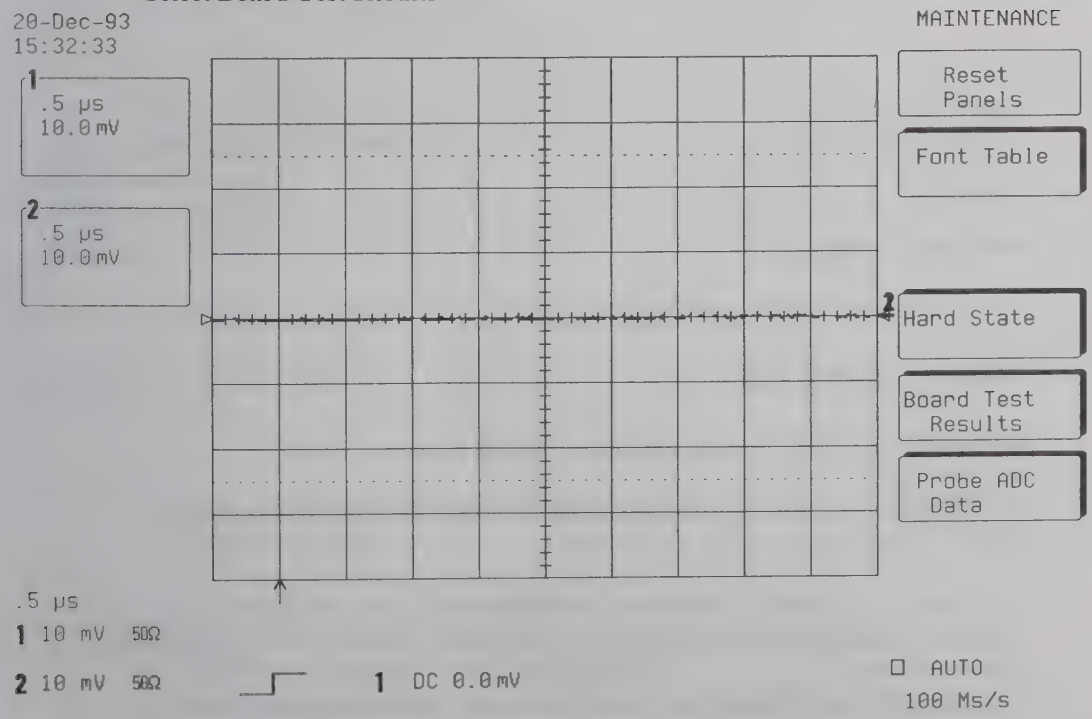
- The theoretical level is shown by the second horizontal line which should be near (< 4 steps) to the measured value for Offset = 0.

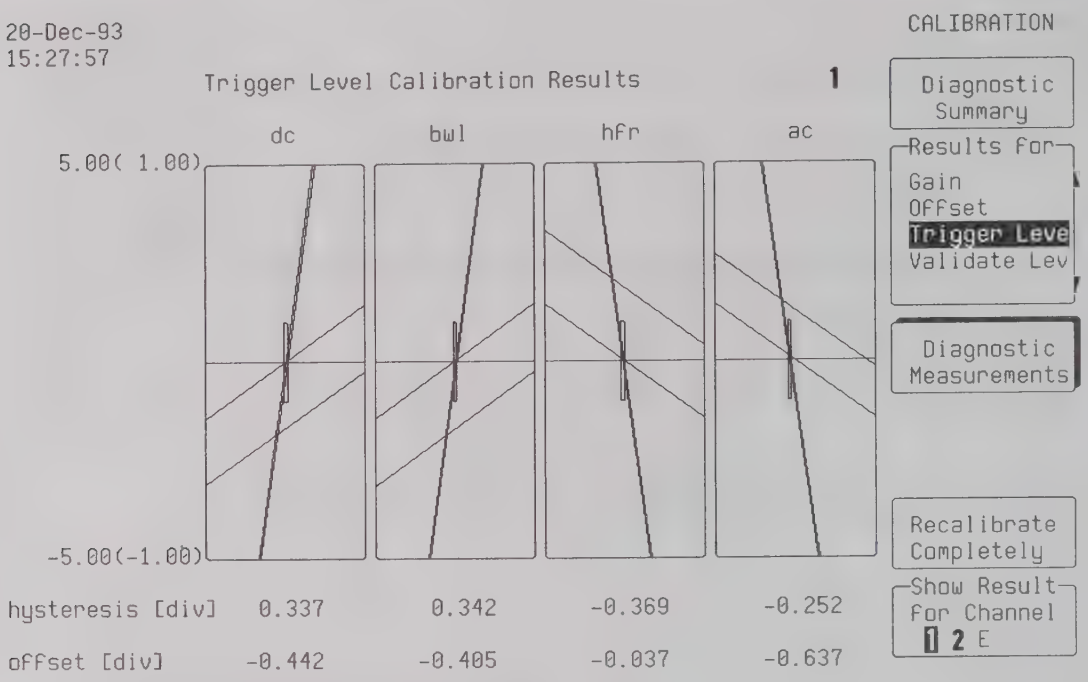


Repeat the test for Channel 2.

6.4 Board Test Results

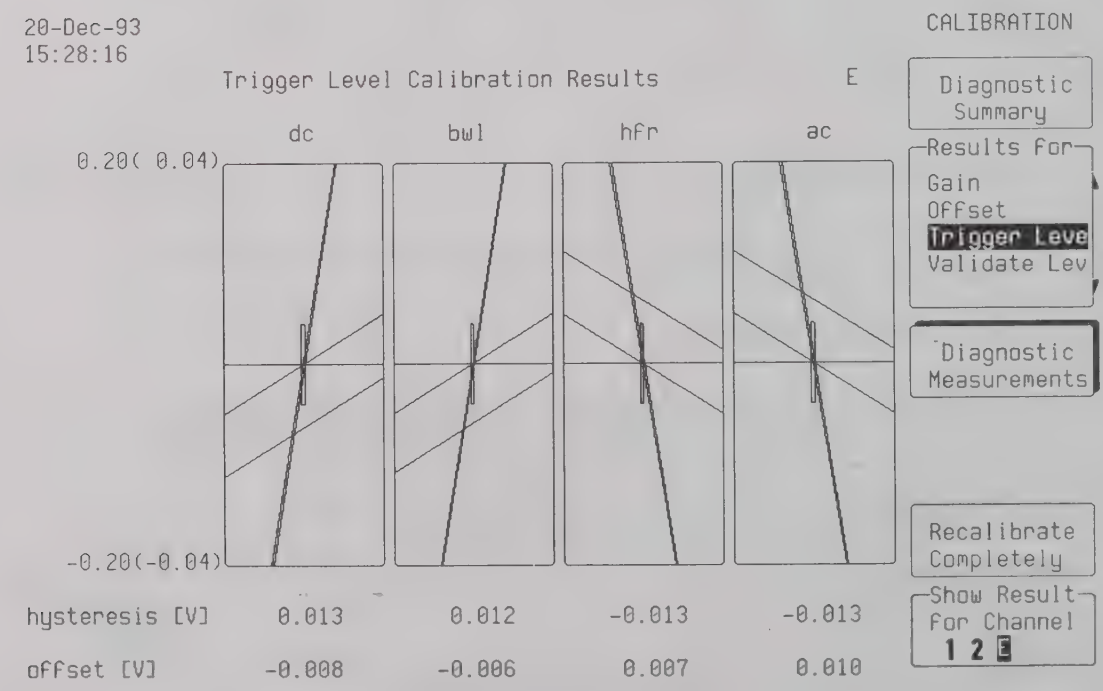
- From the Internal menu press **Maintenance**
- Select **Board Test Results**





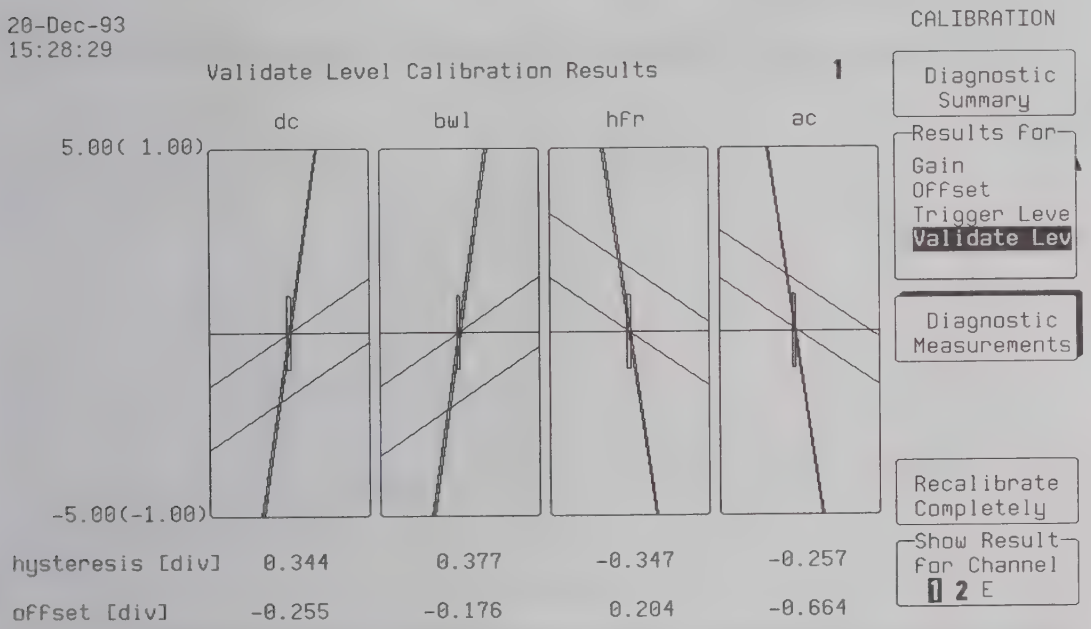
- Select show result for external trigger

- The hysteresis in Volt should be **0.012 V ± 0.002 V**

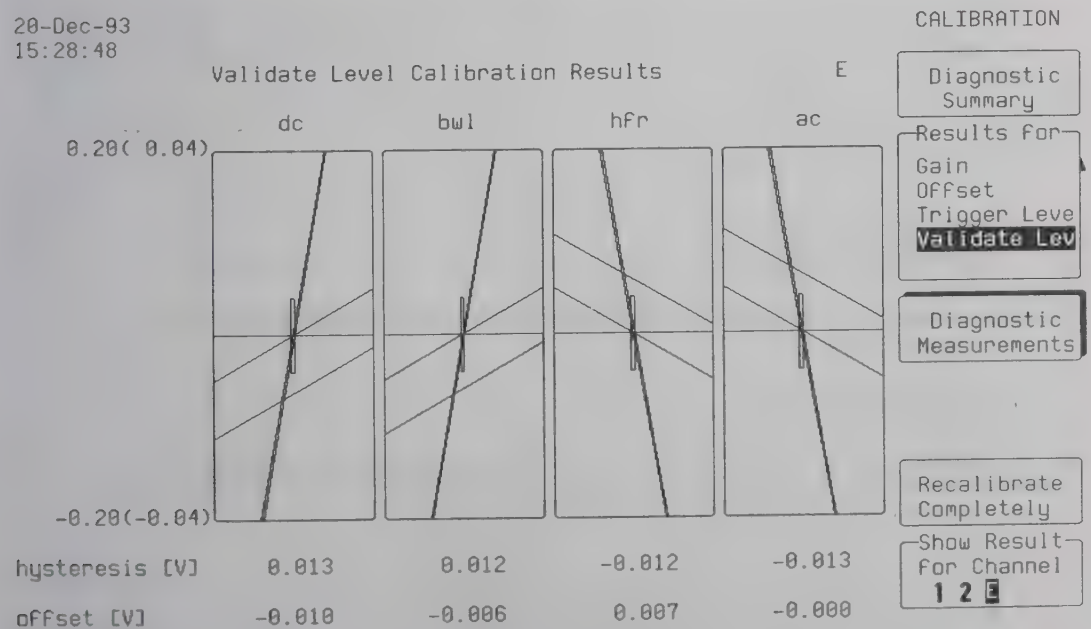


6.3.3.2 Validate Level Calibration

- Select results for **validate level** and press recalibrate completely.
- Select show result for Channel 1 and check the hysteresis in div should be : **0.35 ± 0.05**
- Repeat the test for Channel 2.



- Select show result for external trigger and check : hysteresis in Volt is **0.012V±0.002V**

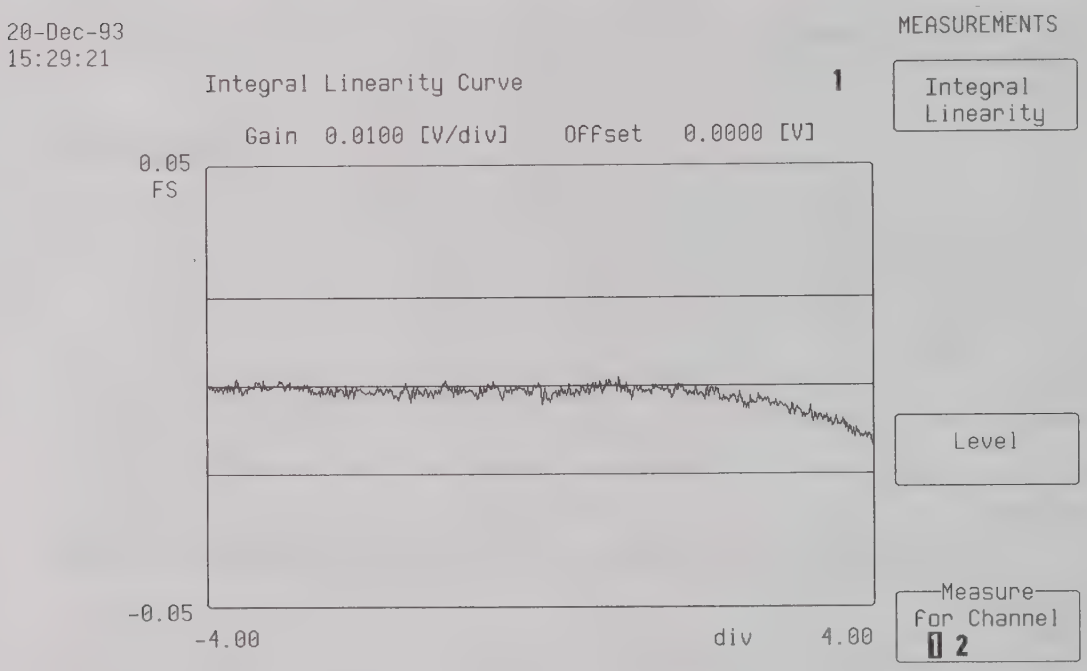


6.3.4 Integral Linearity

- Press **diagnostic measurements**

- Select **integral linearity**
- Measure for **Channel 1**

- The integral linearity curve should be within the ± **0.05 * FS** bars, for offset = 0.0 V.



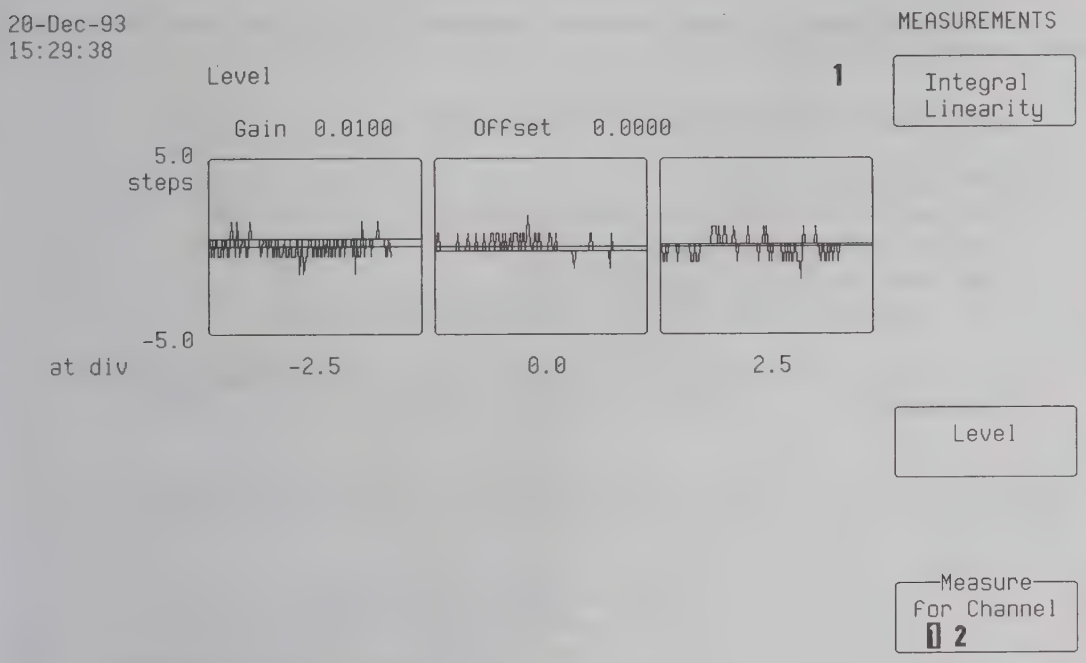
- Repeat the test for Channel 2.

- Press **level**
- Measure for **Channel 1**

- The three plots show raw ADC data displayed around their mean value for 3 different CAL levels.

- The data should be **narrow** and random.

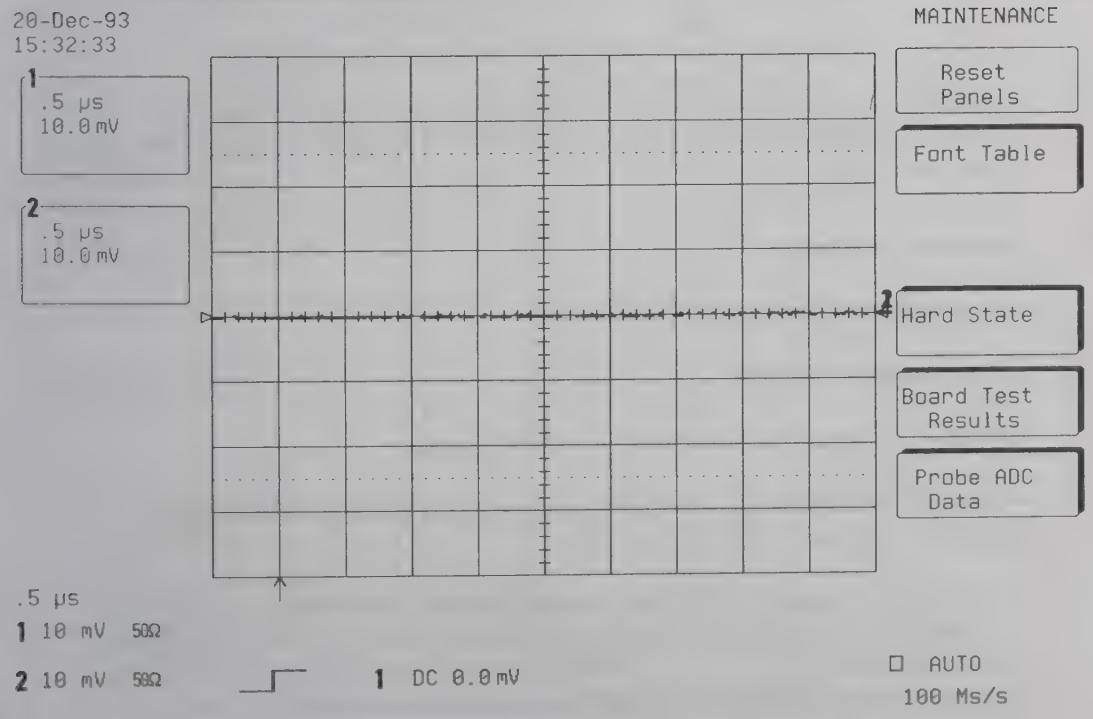
- The theoretical level is shown by the second horizontal line which should be near (< 4 steps) to the measured value for Offset = 0.



Repeat the test for Channel 2.

6.4 Board Test Results

- From the Internal menu press **Maintenance**
- Select **Board Test Results**



- This menu displays the board calibration measured at the factory, the calibration values are loaded in the I2C Prom.

- The header block indicates the following information :

- The test version : i.e 109
- The revision of the printed circuit board : i.e Rev G
- The engineering change order level : i.e ECO 1010
- The work order number : i.e WO 9343-0002
- The tested date : i.e tested 1993-11-25 it should be : ≥ 1993-xx-xx.

- If the date says 1990-04-01 it is a sign that the I2C prom on the -3 board can not be read correctly.

```
20-Dec-93                                                    Board Test
15:30:31



Header:    block lengths 20 32  2 Test version 109  2 chans
       Rev: G, ECO 1010, WO 9343-0002, Tested: 1993-11-25 16:09

MWD Vy DAC: 7F   MWD Vz DAC: 7F
MWD Vy DAC: 7F   MWD Vz DAC: 7F
```

- MWD Vy and Vz DAC : 7F represent the 16 bit setting of the two 200 ns delay (y & z) of the 833 MHz clock used for the HWD418 Hybrid in Channel 1 and Channel 2.

6.5 Probe Bus Verification

- From the Internal menu press **Maintenance**

- Select **probe ADC data**

- This menu displays the probe bus and probe ring status.

- With no probe connected to the input, check that the value in the first column is **251 ± 2** for Channel A, B, C, D and Ext.

- For the 9360, Channel A and B represent the 300 MHz normal inputs Channel 1 and Channel 2, while physical Channel C and D represent the 600 MHz high bandwidth inputs (HIBW).
- For the 9361, only Channel A, B, and Ext are used, corresponding to Channel 1, Channel 2 and External trigger.

```
20-Dec-93                                                    Probe PROM
15:30:57
Physical channel a    252
Physical channel b    252
Physical channel c    252
Physical channel d    252
Physical channel ext  252

ADC values: CAL  252, MON  164, Temperature   96 =   30 C

Interrupts since start-up:
a  :0 b  :0 c  :0 d  :0 ext:0 cal:0 mon:8 T  :12
```

- Connect a **AP020** LeCroy active probe on 300 MHz normal input Channel 1 and check that:

- The probe is identified on physical **Channel A**
- The physical Channel A readout has changed to **21 ± 2.**
- An **interrupt** has been detected on **Channel A**.

```
20-Dec-93                                                    Probe PROM
15:34:38
Physical channel a     21  AP020
          108   41 5030 3230  406 9310    1 1106 4120    0
         1506 3dcc cccd 210a 400e 8f69 388e 77b4 220b c000
            0 4000    0  124  701 4642  100 3406   10   42
         3604  204 4106 3204 48f5   10
Physical channel b    252
Physical channel c    252
Physical channel d    252
Physical channel ext  252

ADC values: CAL  252, MON  164, Temperature   96 =   30 C

Interrupts since start-up:
a  :3 b  :2 c  :2 d  :2 ext:0 cal:0 mon:8 T  :12
```

- Connect a LeCroy passive probe with probe ring i.e **PP002** on 300 MHz normal input Channel 1 and check that :

- The probe **X10** is identified on physical **Channel A.**
- The Channel A value indicates in the first column has changed to **195. ± 2**
- An **interrupt** has been detected on **Channel A.**

```
20-Dec-93                                                    Probe PROM
15:38:56
Physical channel a    194  x10
Physical channel b    252
Physical channel c    252
Physical channel d    252
Physical channel ext  252

ADC values: CAL  252, MON  164, Temperature   96 =   30 C

Interrupts since start-up:
a  :5 b  :2 c  :4 d  :2 ext:0 cal:0 mon:8 T  :12
```

- Repeat the tests for Channel 2 and External Trigger. Check that the probe is identified on physical Channel B or Ext.

- On 9360 only, connect a AP020 LeCroy active probe on 600 MHz high bandwidth Channel 1 and check that :

- The probe is identified on physical **Channel C**
- The physical **Channel C** readout has changed to 21
- An interrupt has been detected on **Channel C**

```
20-Dec-93                                                    Probe PROM
15:35:48
Physical channel a    252
Physical channel b    252
Physical channel c     21  AP020
          108   41 5030 3230  406 9310    1 1106 4120    0
         1506 3dcc cccd 210a 400e 8f69 388e 77b4 220b c000
            0 4000    0  124  701 4642  100 3406   10   42
         3604  204 4106 3204 48f5 402f
Physical channel d    252
Physical channel ext  252

ADC values: CAL  252, MON  164, Temperature   96 =   30 C

Interrupts since start-up:
a  :4 b  :2 c  :3 d  :2 ext:0 cal:0 mon:8 T  :12
```

- On 9360 only repeat the test for HIBW Channel 2 and check that the probe is identified on physical **Channel D**.

SECTION 7 MAINTENANCE

7.1 Introduction

This section contains information necessary to disassemble, assemble, maintain, calibrate and troubleshoot the LeCroy 9360 & 9361 oscilloscope.

7.2 Disassembly and Assembly Procedure

The disassembly and assembly procedures detailed below refer to the assembly and disassembly diagram 7.2.3, and the view of figures 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7 and 7.8. Please study the diagram and figures before attempting disassembly.

WARNING

Before removing any parts from the LeCroy 9360/61, be sure to read carefully the instructions referring to those parts, noting any precautions needed to avoid problems caused by mechanical behaviour, high voltage supplies, etc.

CAUTION

The usual precautions against static electricity are required, (see 1.10)

7.2.1 Removal of the Upper Cover (5.10)

The top cover (5.10) is secured by two M4x5 screws (5.12) on both sides of the front panel assembly (2), and by two M4x8 screws (5.11) on the rear panel (3). Remove the screws and carefully slide the cover off the unit to the rear. Removal of the top cover gives access to the boards and parts listed in section 7.2.3.

7.2.2 Removal of the 93XX-PS1715 Power Supply (4)

WARNING

Ensure the line cord is disconnected. Remove the following:

- Top cover (7.2.1).
- One M4X8 screw (5.2) from left side of the bottom cover (1.1).
- Two M4X8 screws (5.1) from left side of the rear panel (3).

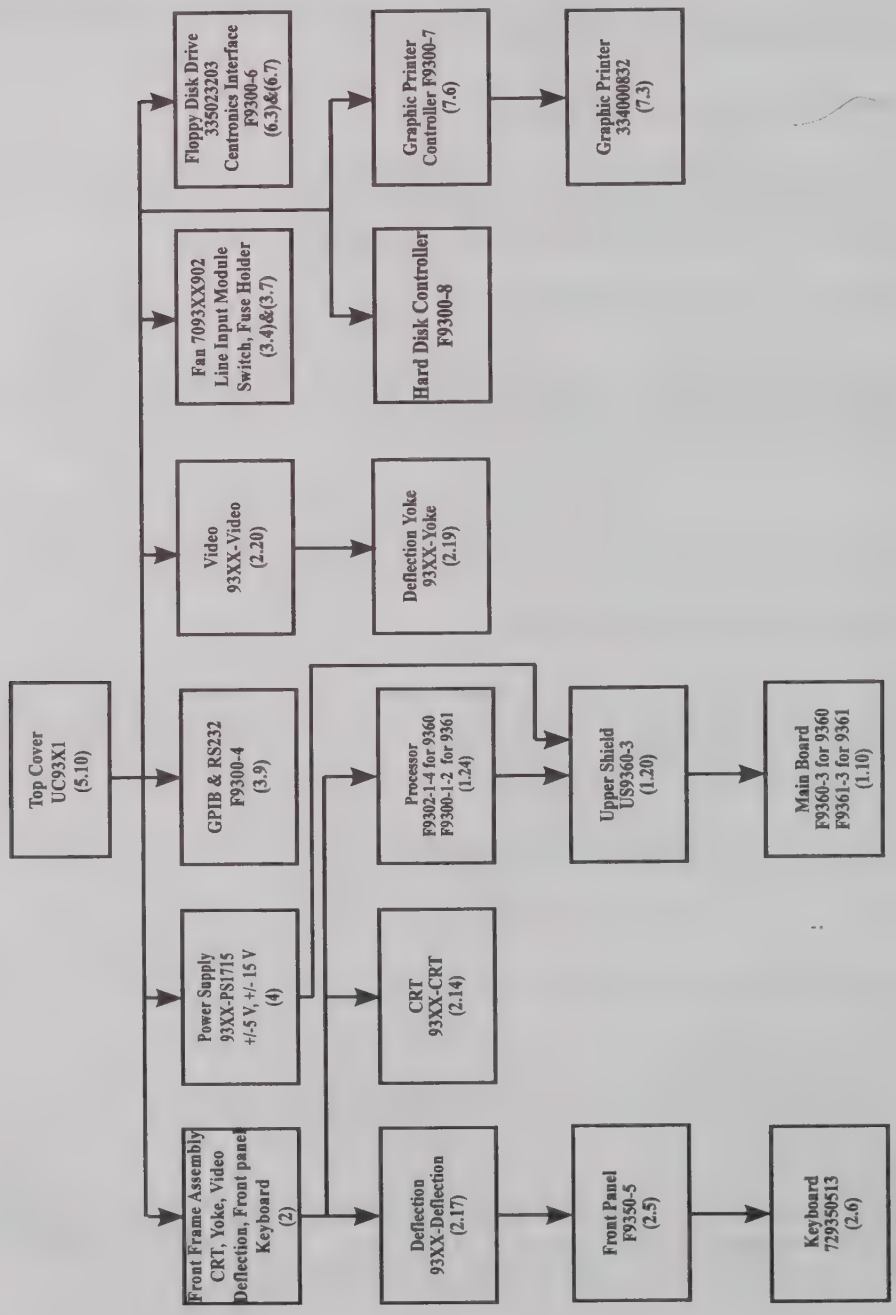
Disconnect the following:

- Base card power cable (5.9) from main board connector J200.
- PS1715 line input cable (3.20) from connector J6.
- Auxiliary power cable from optional internal graphic printer.

The power supply can now be removed vertically from the oscilloscope.

7.2.3 Disassembly and Assembly Diagram

Disassembly : If it becomes necessary to replace a board or a part, use the disassembly diagram to disassemble the unit. Any board can be removed if items higher in the diagram and connected by a line are already out.



Assembly : Reassemble the unit in the reverse order.

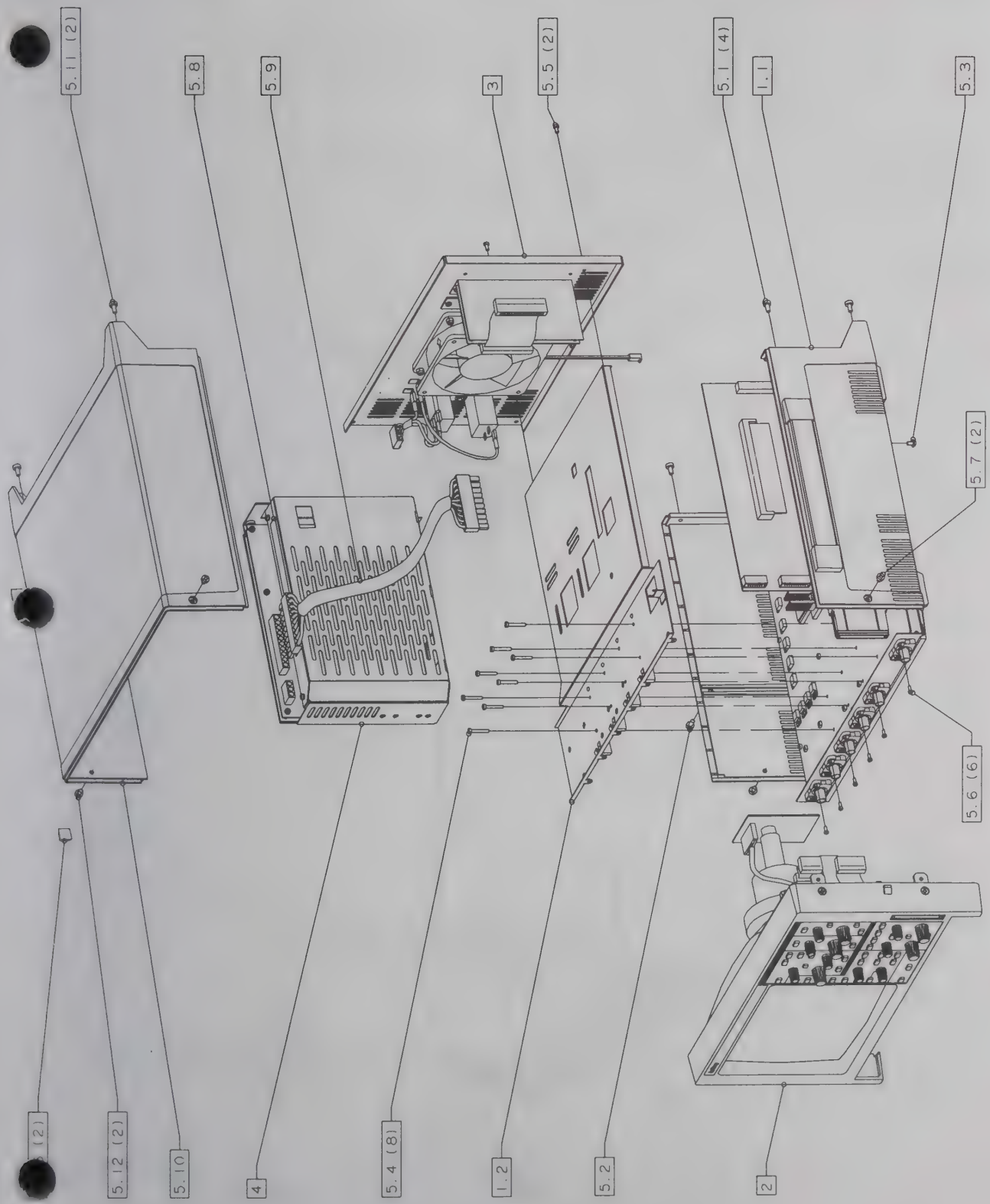


Figure 7.1 : 9360 Assembly

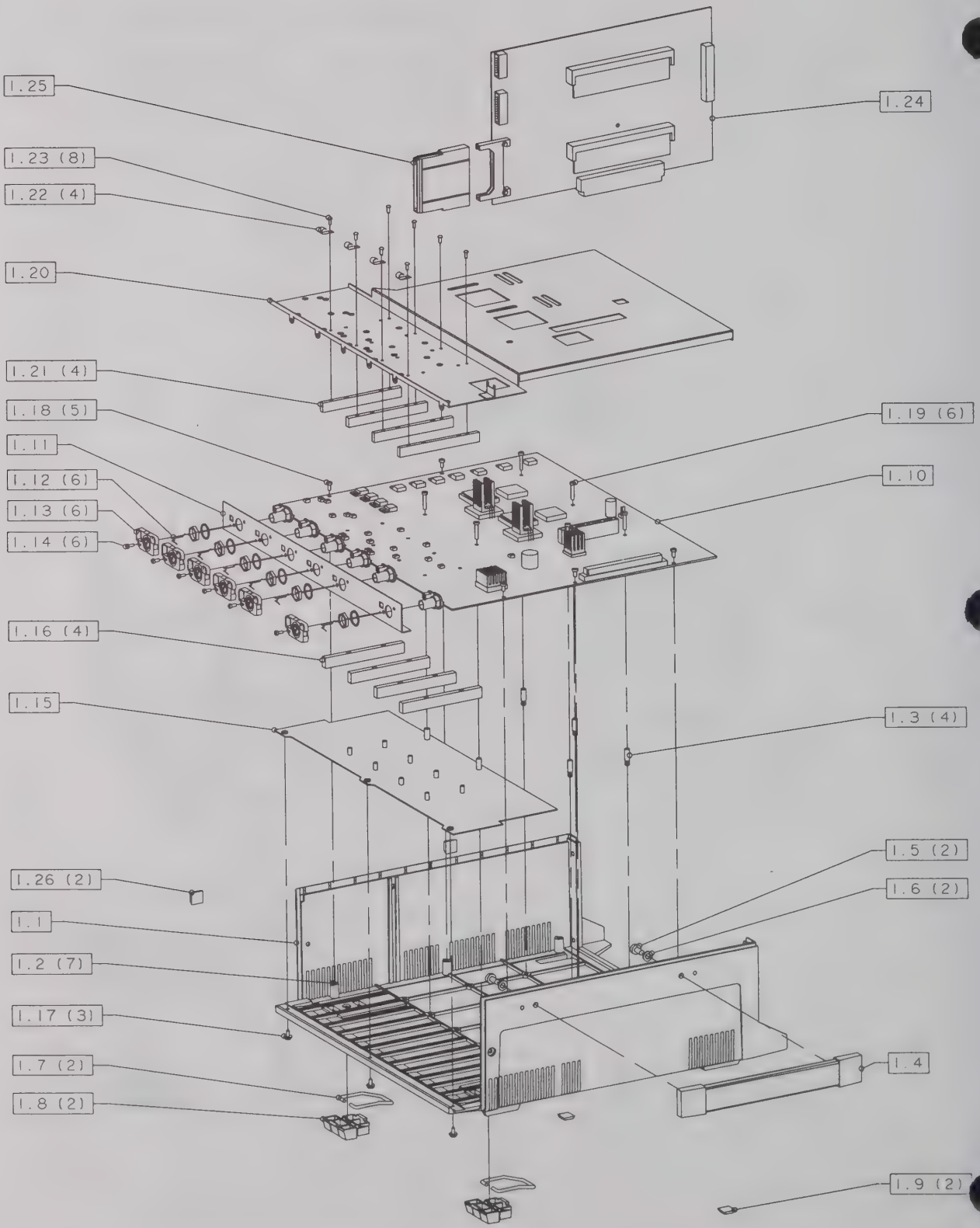


Figure 7.2 : 9360 Lower Cover Assembly

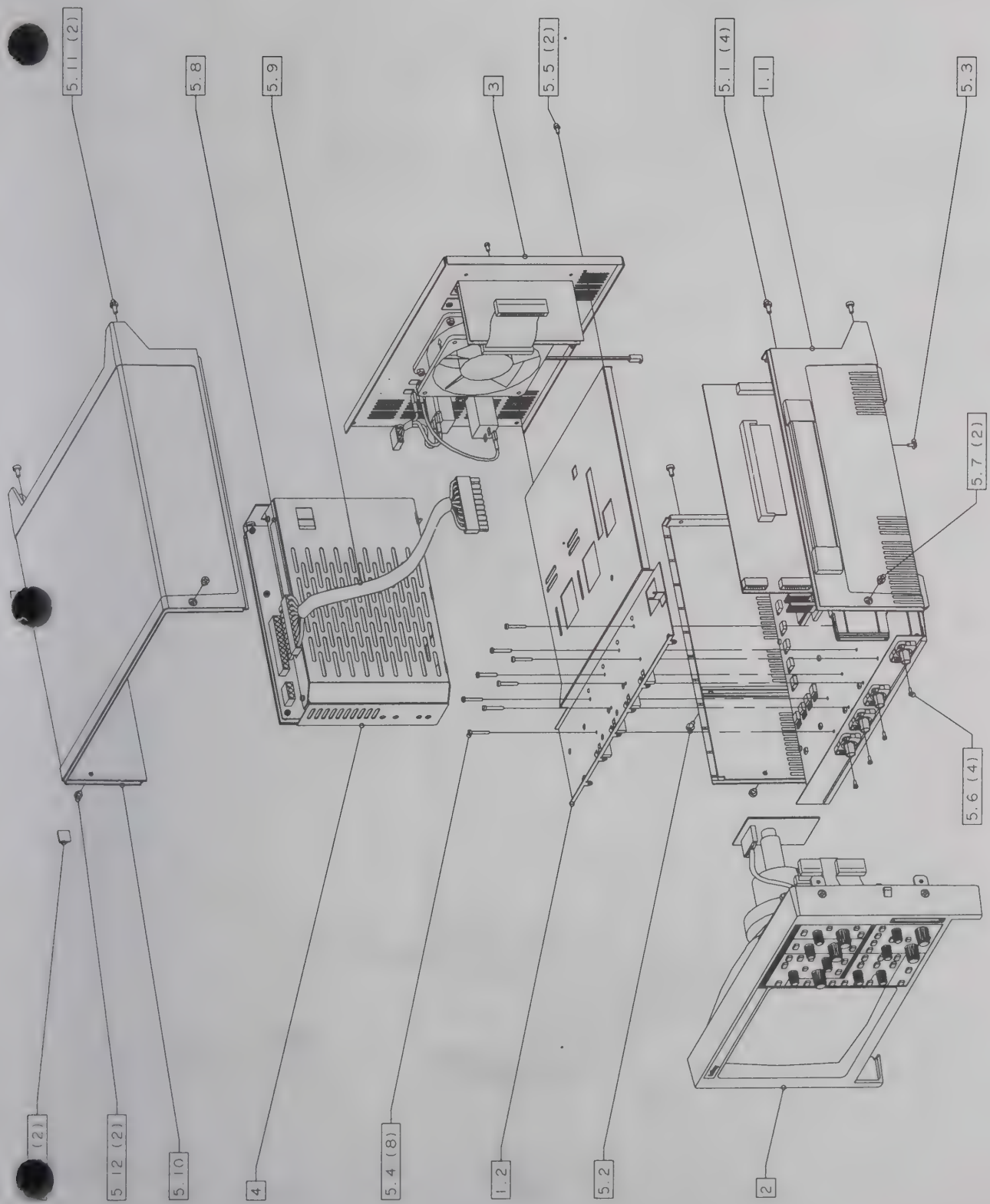


Figure 7.3 : 9361 Assembly

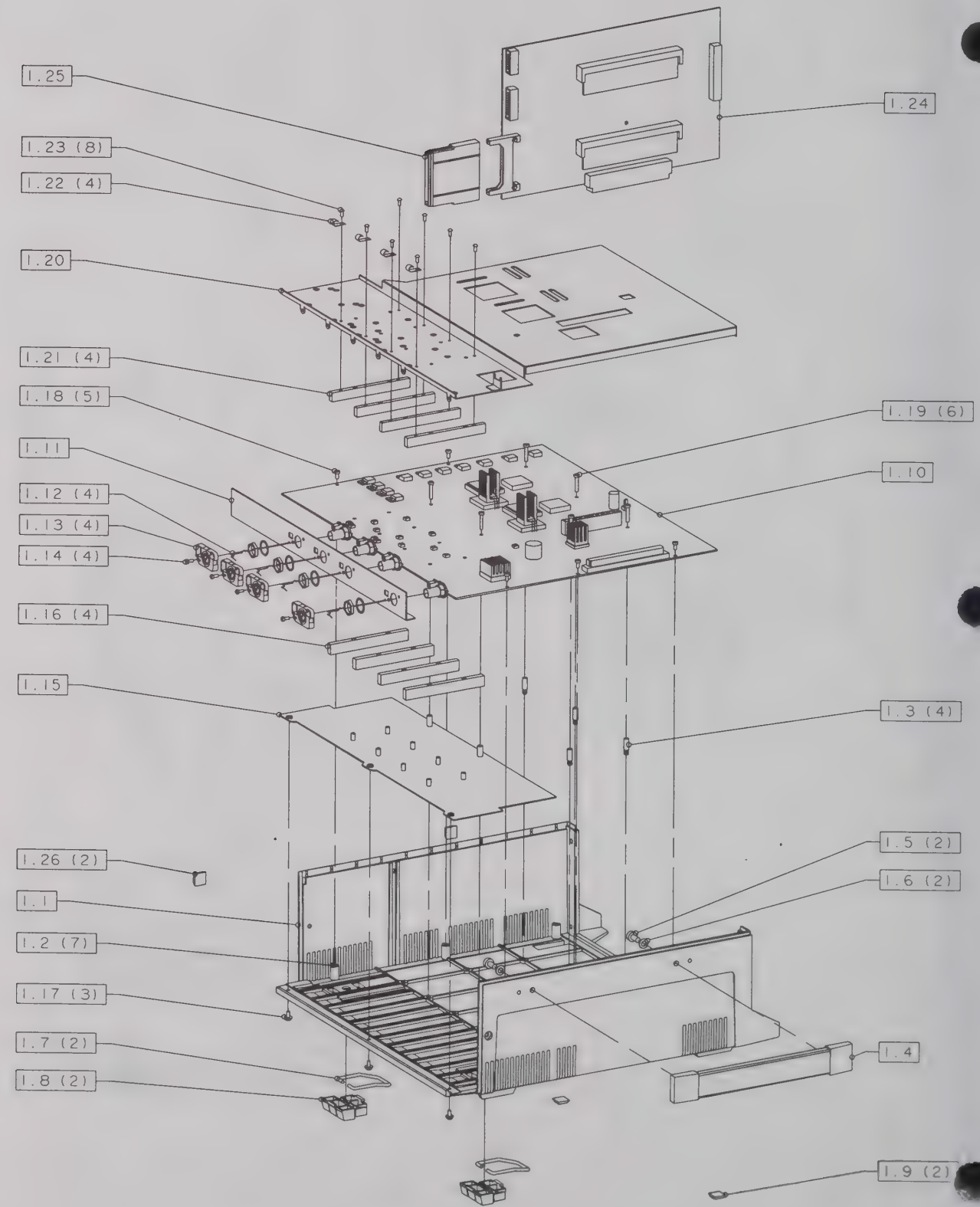


Figure 7.4 : 9361 Lower Cover Assembly

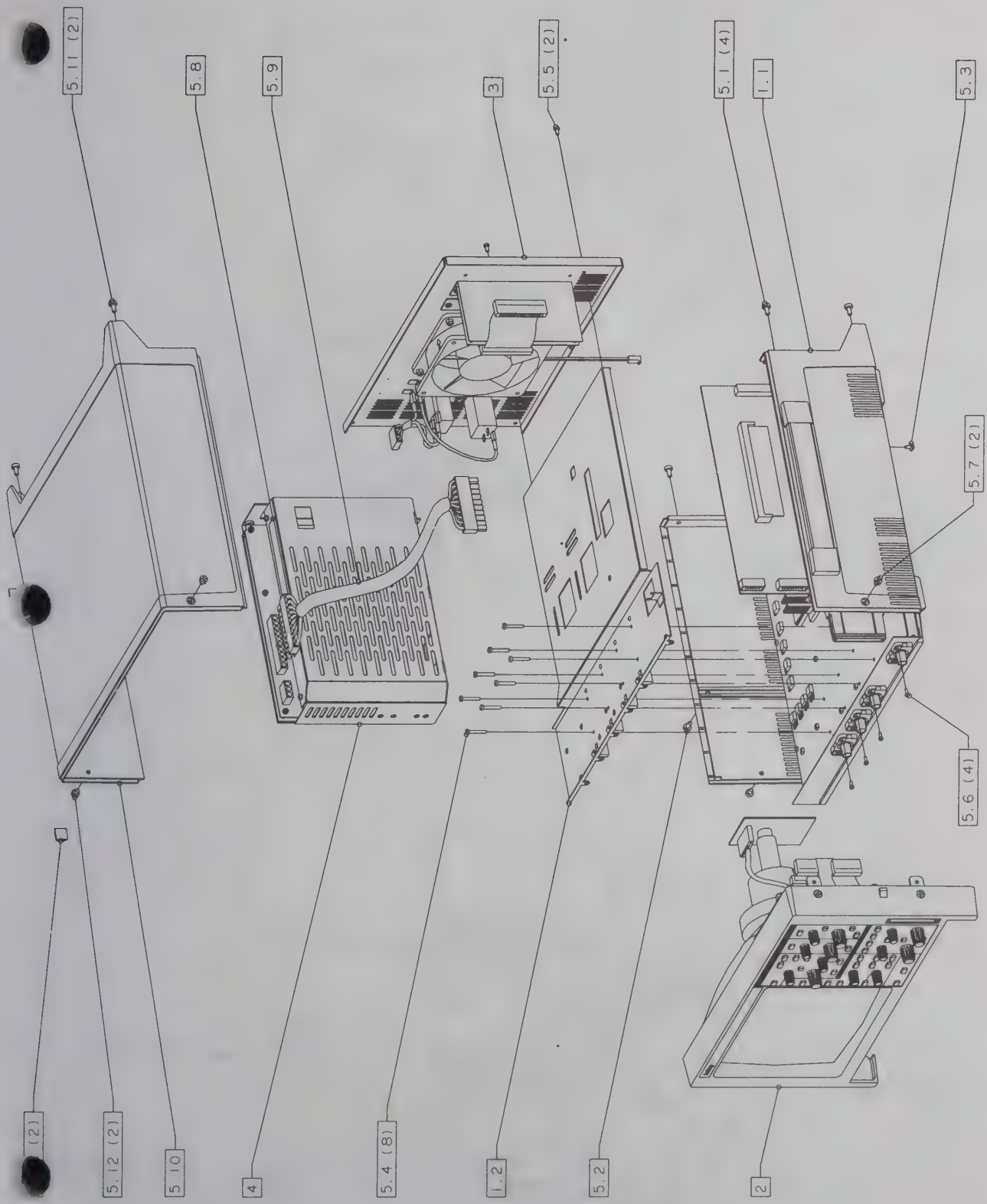


Figure 7.3 : 9361 Assembly

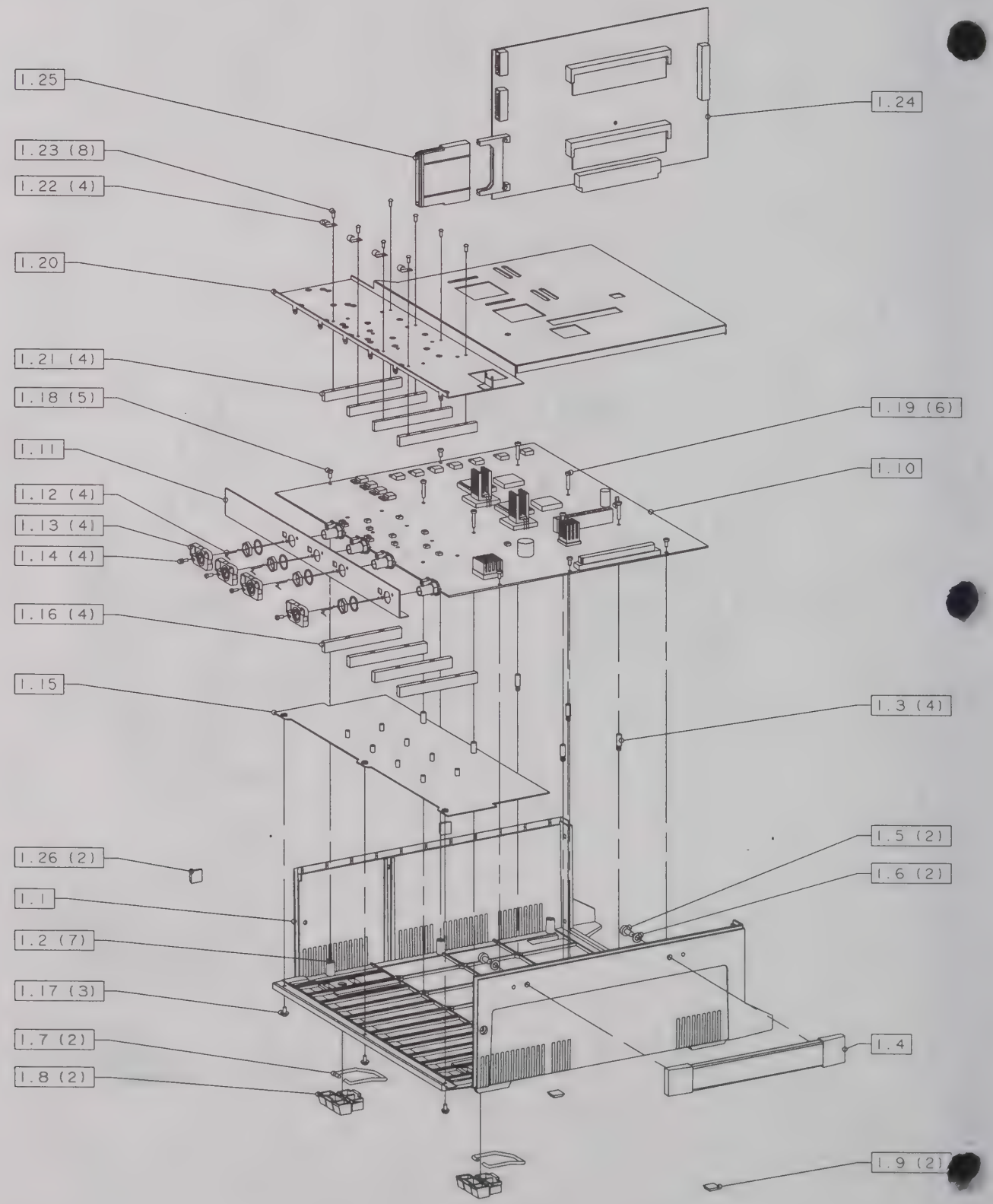


Figure 7.4 : 9361 Lower Cover Assembly

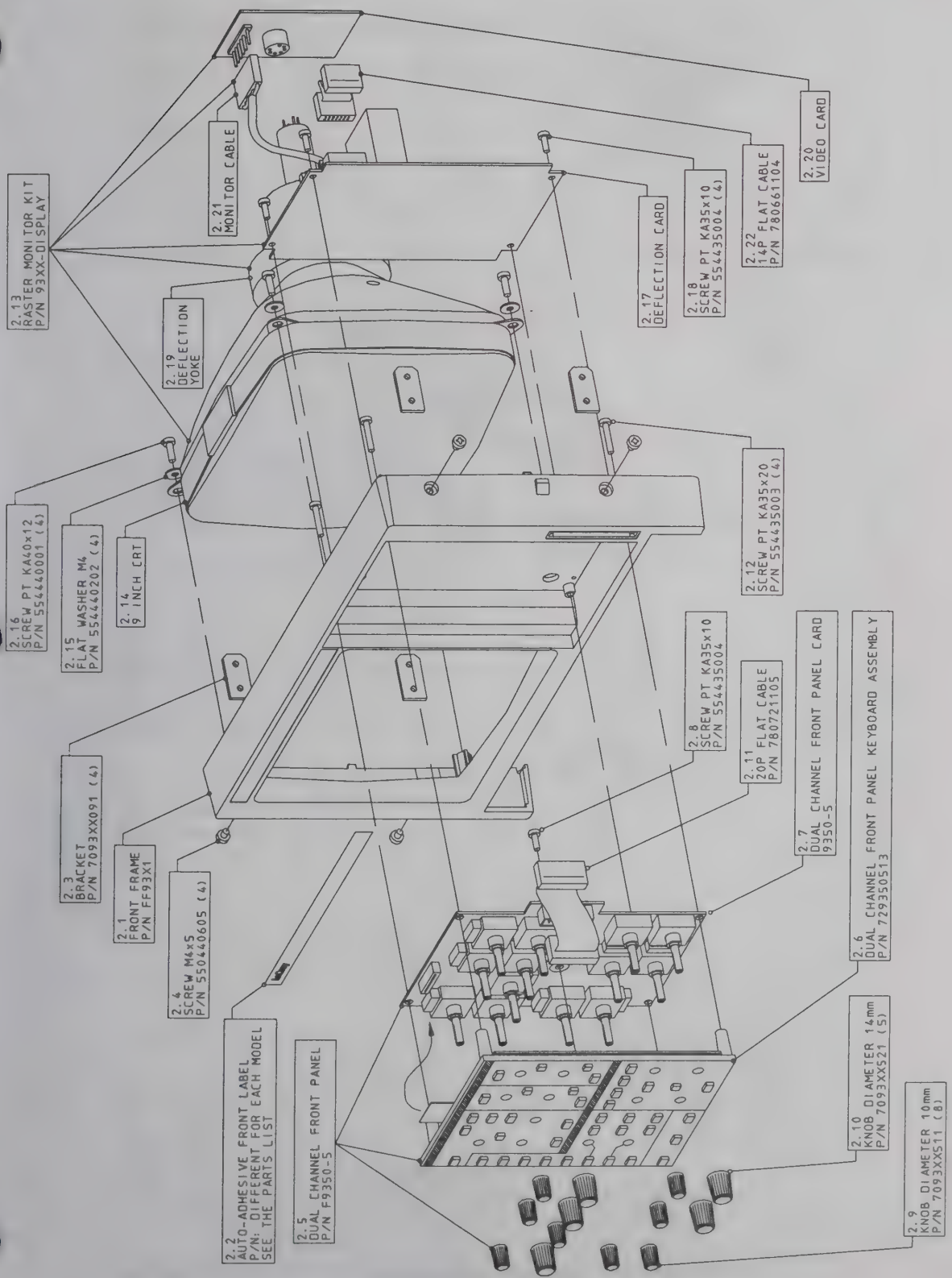


Figure 7.5 : 9360 & 9361 Front Frame Assembly

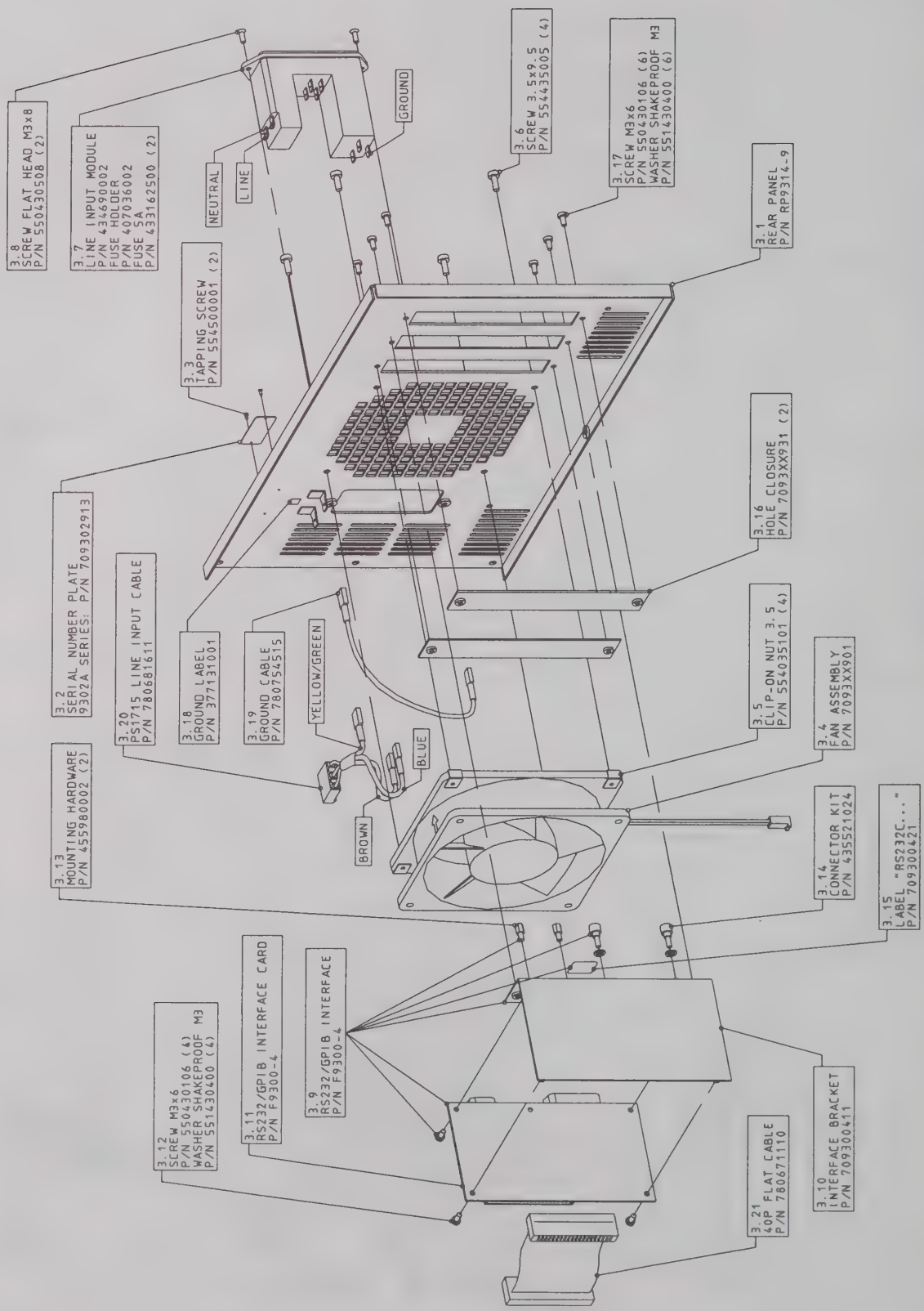


Figure 7.6 : 9360 & 9361 Rear Panel Assembly

7.2.4 Removal of the F9300-4 GPIB/RS232 Interface (3.11)

The GPIB/RS232 interface (3.9) is vertically mounted on the rear panel (3.1).

Remove the following:

- Top cover (7.2.1).
- Two M3x6 screws (3.17) and washers from the rear panel (3.1).

- Disconnect the flat cable (3.21) from the processor board (1.24) connector J5.

The GPIB/RS232 board can be removed forwards from the rear panel.

7.2.5 Removal of the Fan (3.4)

Remove the following:

- Top cover of 9360 (7.2.1)
- Four screws (3.6) and nuts (3.5) from the rear panel (3.1).
- Disconnect the fan power cable from the main card F9360-3 connector J901.

The fan (3.4) part number : 7093XX902 can be removed from the unit.

CAUTION

Note the air flow, the fan extracts air from the unit and expels it.

7.2.6 Removal of the Fuse Holder (3.7)

WARNING

Disconnect the power cord.
Remove the following:

- Top cover (7.2.1).
- Two screws (3.8) from the rear panel.
- Disconnect the power cable (3.20) from the power supply.
- Disconnect the earth cables (3.19).

The fuse holder assembly (3.7) can be removed from the rear panel (3.1).

7.2.7 Removal of the 93XX-Video (2.20)

- Remove the top cover (7.2.1).
- Disconnect the ground cable from CRT (black wire)
- Disconnect the monitor cable (2.21) from the deflection board, connector W301 & W302.

Ease the video board (2.20) carefully toward the back of the DSO, until it is free.

7.2.8 Removal of the 93XX-Yoke (2.19)

- Remove the top cover (7.2.1).
- Remove the 93XX-video board (7.2.7)
- Disconnect the cable from the deflection board connector W201.
- Loose the screw on the yoke ring holder.

The deflection yoke (2.19) can be removed from the cathode ray tube (2.14).

7.2.9 Removal of the front frame Assembly (2)

Remove the following:

- Top cover (7.2.1)
- Two screws (5.8) that secure the front frame assembly (2) to the lower cover (1.1).
- Disconnect the front panel flat cable (2.11) from the processor (1.24) connector J4.
- Disconnect the deflection flat cable (2.22) from the processor board connector J6.

The front frame assembly (2) with the CRT (2.14), yoke (2.19), video (2.20), deflection (2.17), front panel (2.7) and keyboard (2.6) can with care be removed forward from the unit.

CAUTION

Hold the CRT very carefully, or place soft padding under it.

7.2.10 Removal of the 93XX-Deflection (2.17)

The deflection board (2.17) is situated to the back of the front panel (2.5).

Remove the following

- Top cover (7.2.1).
- Front frame assembly (7.2.9).
- Disconnect the monitor cable (2.21) which lead to the video board (2.20), connector W301 and W302.
- Disconnect the cable from the deflection yoke, connector W201.
- Disconnect the EHT plug from the receptacle at the right side of the CRT (2.14).

WARNING

Touch the free end of the EHT cable to the ground, this ensures that no significant charge remains. The CRT must be discharged similarly, using a tool or a long screw driver which is first placed to the ground and on the CRT receptacle.

Remove the four M35x10 screws (2.18) that secure the deflection board to the plastic front frame.

The board (2.17) can now be removed from the unit.

7.2.11 Removal of the 93XX-CRT (2.14)

It is necessary to remove the front frame assembly (7.2.9). The CRT is secured to the plastic front frame by four screws (2.16).

- Remove the 93XX-video (7.2.7).
- Remove the 93XX-yoke (7.2.8).
- Disconnect the EHT cable from the deflection board. ▪ Discharge the tube.
- Remove the four screws.

The CRT can now be removed from the front frame.

WARNING

Use care when handling the CRT. Avoid striking it on any object which may cause the tube to implode. Store the cathode ray tube face down on a soft surface.
To avoid electrical shock the CRT should be discharged after the 9360 & 9361 oscilloscope is powered OFF. After disconnecting the EHT plug, ground the CRT anode lead to the metallic display support, repeat the operation to fully dissipate the charge.

7.2.12 Removal of the F9350-5 Front Panel (2.5)

Remove the following:

- Upper cover (7.2.1).
- Front frame assembly (7.2.9).
- 93XX-deflection board (7.2.10).
- Four screws (2.12) that secure the front panel.

The front panel (2.5) with the keyboard (2.6) can be removed forward from the unit.

7.2.13 Removal of the Front Panel Keyboard (2.6)

Remove the following:

- Upper cover (7.2.1).
- Front frame assembly (7.2.9).
- 93XX-deflection board (7.2.10).
- F9350-5 front panel (7.2.12).
- The 13 rotary knobs (2.9 and 2.10).Take great care of the soft plastic
- One screw (2.8) that secures the keyboard to the front panel.
- Disconnect the flat ribbon cable from the front panel connector J2, and remove the keyboard P/N : 729350513.

CAUTION

When removing or installing the keyboard or the front panel, be careful of the fragile flat ribbon cable and connector.

7.2.14 Removal of the Processor (1.24)

The processor board F9302-1-4 for 9360 or F9300-1-2 for 9361 is located along the right side of the instrument.

Remove the following:

- Top cover (7.2.1).
- Front frame assembly (7.2.9).
- Disconnect the flat cable (3.19) from the F9300-4 GPIB interface connector J5

The processor can be removed vertically from the main card (1.10) F9360-3 or F9361-3 connector J1

CAUTION

Static electricity can damage components (RAM, Eproms, microprocessor...). Antistatic precautions are required.

7.2.15 Removal of the F9360-3 or F9361-3 Main Card (1.10)

Remove the following:

- Top cover (7.2.1).
- Front frame assembly (7.2.9).
- Power supply (7.2.2).
- Processor (7.2.14).

The main board with the upper shield (1.2) is horizontally mounted to the lower case cover (1.1).

- Remove the eight M3x20 screws (5.4), two M3x6 (5.5) and six M2.5x6 (5.6) that secure the upper shield (1.2) to the main board and front panel.
- Remove the two M4x8 and one that secure the rear panel assembly (3) to the lower cover (1.1)
- Disconnect the fan cable from connector J901

The upper shield (1.2) attached to the rear panel (3) can be removed forward from the board.

- Remove the five M3x6 screws (1.18), six M3x16 (1.19) and three M3x6 flat head screws (1.17) that secure the board to the lower cover (1.1).

The main board F9360-3 or F9361-3 (1.10) with base shield (1.15) and card panel (1.11) can be removed from the scope.

CAUTION

Antistatic precautions are required.

7.2.16 Removal of the Handle (1.4)

The handle with two black end caps is secured to the right side of the lower cover (1.1) by two screws (1.5) and washers (1.6).

- Remove the upper cover (7.2.1), and processor board (7.2.14).

The handle can be removed from the lower case.

7.2.17 Removal of the Foot Support (1.8)

The two foot supports are clipped on the lower cover (1.1).

- Remove the foot (1.7) or the support (1.8) by inserting a small flat screwdriver under the support

7.2.18 Removal of the 93XX-FD01 Floppy Disk Drive Option

- Remove the upper cover (7.2.1).
- Disconnect the flat ribbon cable from the F9300-6 interface (see figure 7.7).
- Remove the two M3x6 screws that secure the floppy drive support to the upper cover.
- Remove the support 70FD01021 and frame 70FD01031 from the cover.
- Remove the four M2.5x4 screws that secure the floppy to the support

The floppy disk (6.3) drive can be removed from the frame

7.2.19 Removal of the 93XX-GP01 Graphic Printer and F9300-7 Controller Option

- Remove the upper cover (7.2.1).
- Disconnect the power cable (780210030) from the 93XX-PS1715 power supply (see figure 7.8).
- Disconnect the flat ribbon cable (780791604) from the F9300-7 controller (see figure 7.7 ot 7.8).
- Disconnect the flat ribbon cable (780721022) between the F9300-6 interface and F9300-7 controller.
- Remove the four M3x6 screws that secure the F9300-7 controller to frame (70GP01031).
- Remove the F9300-7 controller
- Remove the two M3x6 screws that secure the printer to the frame

The graphic printer (7.3) can now be removed from the upper cover.

7.2.20 Removal of the F9300-6 Centronics Interface Option

- Remove the upper cover (7.2.1).
- Remove the two M3x6 screws from the rear panel
- Disconnect the flat cable from the F9300-4 GPIB/RS232 board (see figure 7.7 or 7.8).

The Centronics interface board can be removed forward from the rear panel.

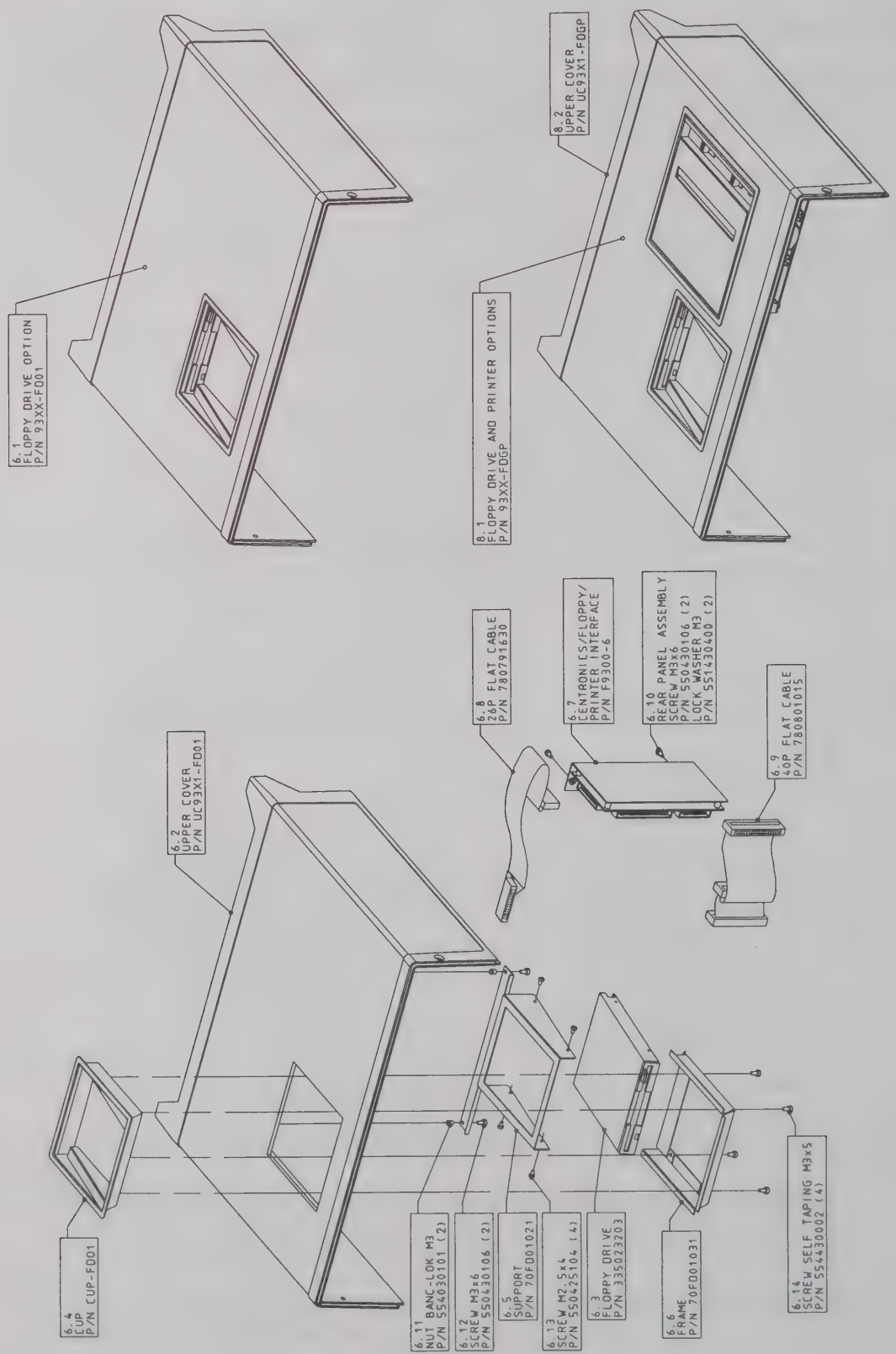


Figure 7.7 : 9360 & 9361 Floppy Assembly

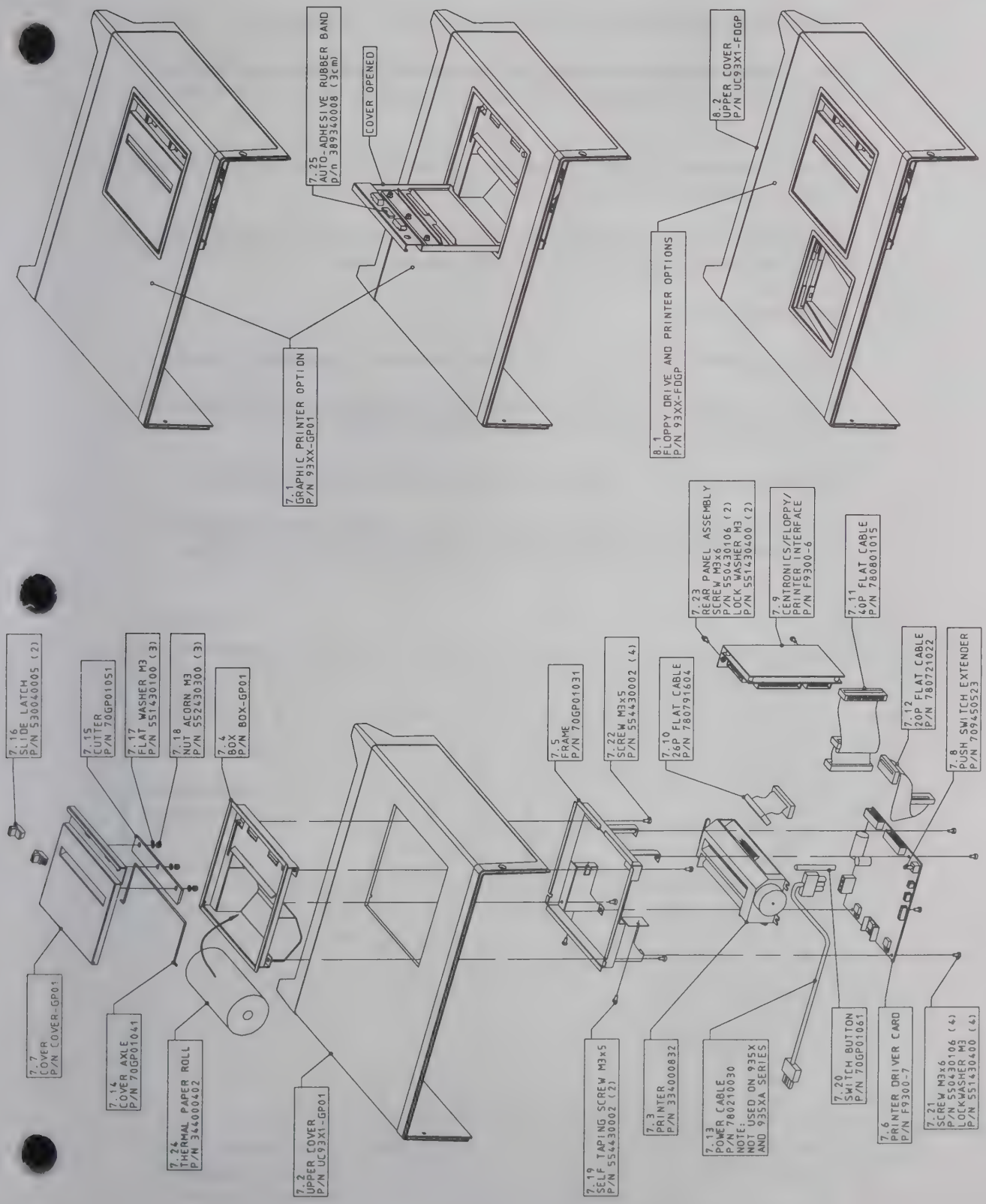


Figure 7.8 : 9360 & 9361 Graphic Printer Assembly

7.3 Software Upgrade Procedure

F9302-1-4 processor board for 9360 DSO has one 8MB Flash Prom which contains the program memory and the character font used by the graphic processor of the raster scan display.

F9300-1-2 processor for 9361 DSO, carries four 2 MB EPROM (loc. A22,A27,A29,A38) for the Firmware, and one EPROM (loc. A1) for the character font.

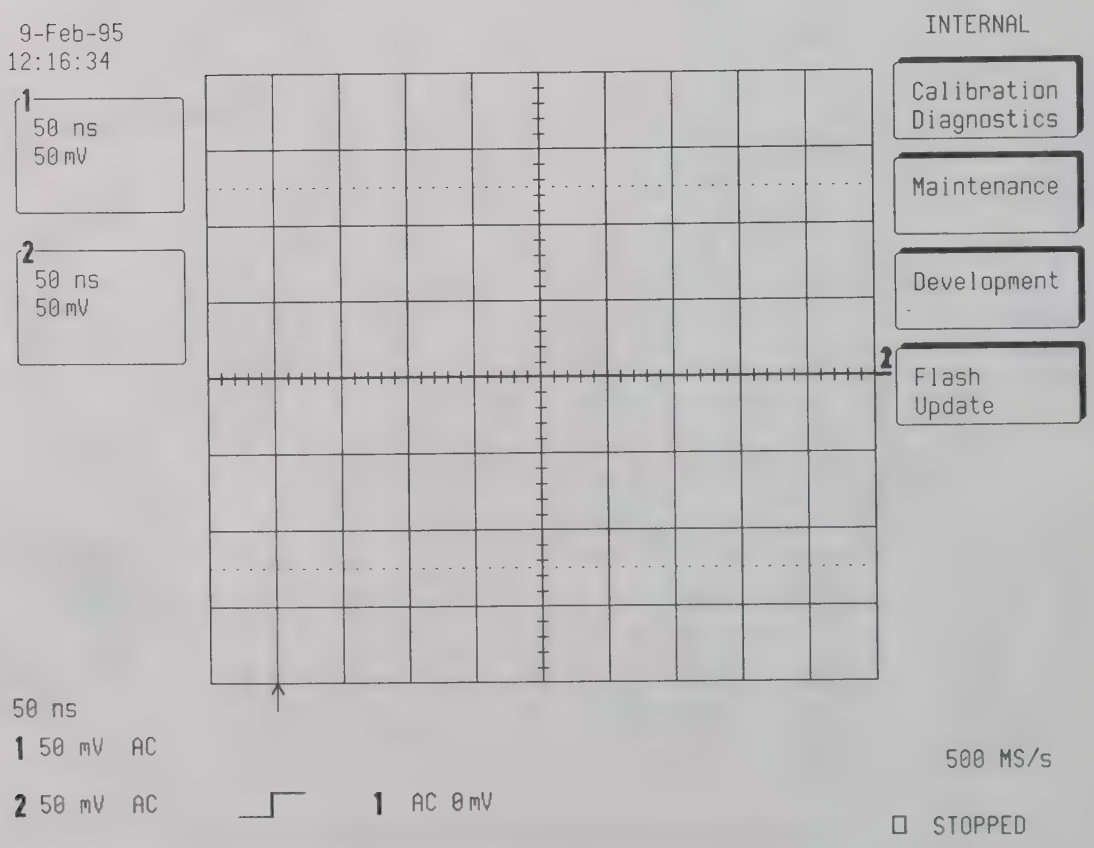
After any software change, a general instrument reset is mandatory. Simultaneously press the autosetup button, the top menu button and the return button.

7.3.1 Upgrading Firmware

LeCroy Corporation has a policy of continually improving and upgrading its products.

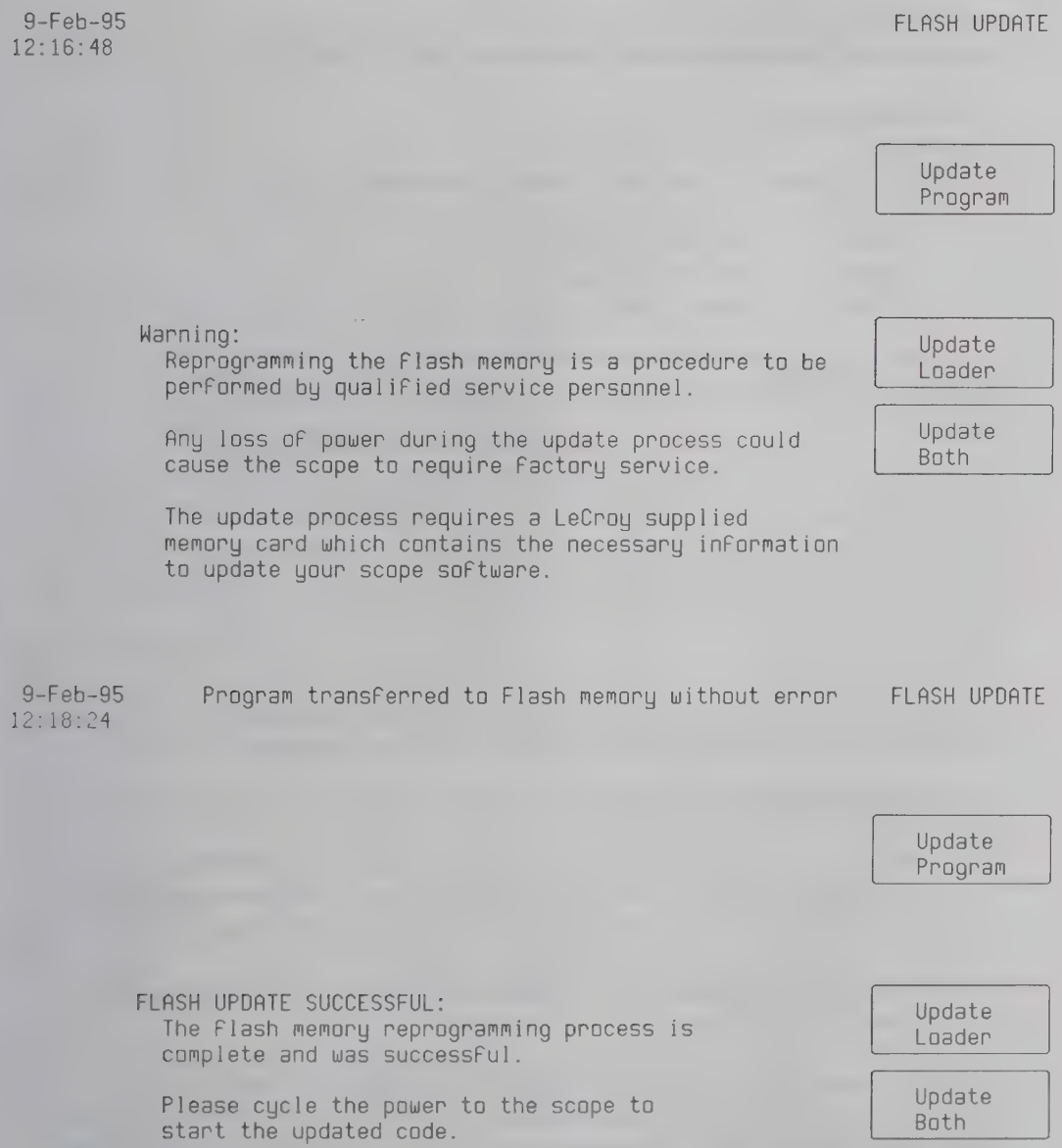
The 9360 instrument is equipped with Flash Prom on processor board, the Software is upgraded to the latest version using the Memory Card interface.

- Insert one Memory card with latest firmware revision, and power on the scope.
- The internal menu is entered by simultaneously depressing the third and fourth menu push buttons on the right hand side of the CRT and then by depressing the fifth.



- Select " **Flash Update** " and push twice " **Update Program** ".

The Software is then downloaded to the Flash Prom on the processor board.



- 9361's firmware can be upgraded to the latest version by changing four EPROM's on the processor board at locations A22, A27, A29 & A38. Access is possible by removing the upper cover. The EPROM can be removed using an IC extractor. Make sure that the guiding notch in the chip is aligned with the PCB.

7.3.2 Changing Software Options

The software option selection GAL is located on the processor board at location A19 on F9300-1-2 or A49 on F9302-1-4 processor board.

Insert or replace the GAL to select new options.
Make sure that the orientation notch is correctly aligned with the PCB.

7.3.3 Software Option Selection GAL

The following software options are available : (see section 2)

WP01	Advanced Math package
WP02	Basic FFT package
CARD	Memory card

OPTIONS			GAL Description
Memory Card	WP02	WP01	CLE XXX-R XXX = Software option, R = Release
no	no	no	GAL Not Necessary
no	no	yes	CLE 001-A
no	yes	no	CLE 002-A
no	yes	yes	CLE 003-A
yes	no	no	CLE 200-A
yes	no	yes	CLE 201-A
yes	yes	no	CLE 202-A
yes	yes	yes	CLE 203-A

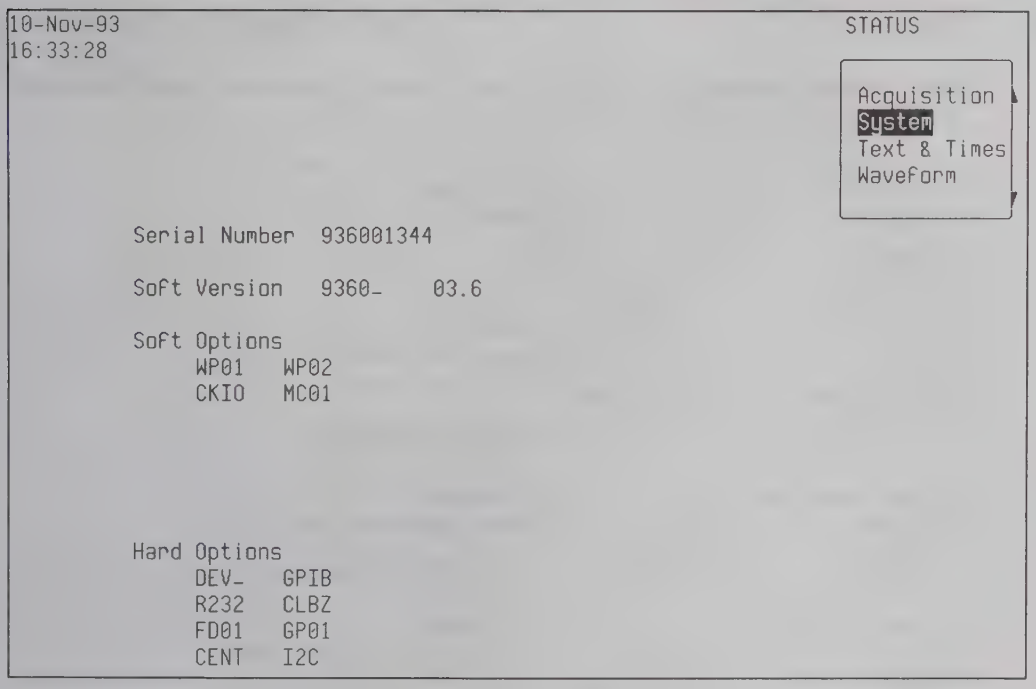
7.3.4 Processor Board Exchange Procedure

The replacement board is supplied without any options. Therefore the existing GAL at Loc. A19 or A49, must be transferred from the faulty board to the new board. After upgrading firmware or changing the software option, check that the scope boots correctly.

Then check in the system summary, by using the show status button on the front panel, the software version, software options and serial number.

The serial number of the 9360/61 oscilloscope is loaded in the real time clock memory which is battery backed up. If it becomes necessary to replace the processor board, the serial number must be loaded in the memory of the new board by using LeCroy program " LeCalsoft " under GPIB remote control.

To run " LeCalsoft " type SKP.exe, in the main menu type S, and follow the instructions, use five digits to enter the serial number (i.e. 01344).



7.4 Equipment and Spare Parts Recommended for Service

7.4.1 Equipment

The following equipment is needed to provide the technician access to the 9360/61 subassemblies during repair and calibration (see also Performance Verification section 5).

Instrument	Qty	Specifications	Recommended
Signal Generator (sine wave)	1	Frequency : 500 KHz to 1 GHz Accuracy : 0.001 % Amplitude : 1 V peak to peak	Marconi 2030 or equivalent
Signal Generator (sine wave)	1	Frequency : 5 KHz Amplitude : 6 V peak to peak	LeCroy LW420 or equivalent
DC precision Power Supply	1	Amplitude : 10 V, DC Accuracy : < 0.1 %	Tektronix PS5004
Digital Multimeter	1	5 digits	Keithley 199
Fast pulser	1	Rise time < 500 psec	LeCroy 4969
Digital scope	1	Bandwidth 350 MHz	LeCroy
Cable	1	BNC, 50 Ω, length 20 cm & 100 cm (7.87 & 39.37 inches)	Suhner
BNC T adapter	1	BNC, 50 Ω, T adapter	Suhner

7.4.2 Spare Parts

In order to make the repair of 9360 & 9361 oscilloscope at board level, a minimum stock of boards is at least one each:

- F9302-1-4 : Processor board for 9360
- F9300-1-2 : Processor board for 9361
- F9360-3 : Main board for 9360
- F9361-3 : Main board for 9361
- F9300-4 : GPIB/RS232 interface
- F9350-5 : Front panel with keyboard
- 93XX-Display : Raster monitor kit
- 93XX-PS1715 : Power supply

If the unit is equipped with the 93XX-FD01 option :
- F9300-6 : Floppy, Graphic printer, Centronics Interface
- 335023203 : Floppy disk drive

If the unit is equipped with the 93XX-GP01 option :
- F9300-6 : Graphic printer, Floppy, Centronics Interface
- F9300-7 : Graphic printer controller
- 334000832 : LPT5446 Seiko Graphic printer

If the unit is equipped with the 93XX-HD01 option :
- F9300-8 : Hard disk Interface
- HDD02 : Hard disk drive

7.5 Troubleshooting and Flow Charts

Most procedures in this section will allow troubleshooting down to the **BOARD LEVEL.** Defective circuit boards will be repaired or exchanged by the regional LeCroy service office or the local representative (see section 1.4).

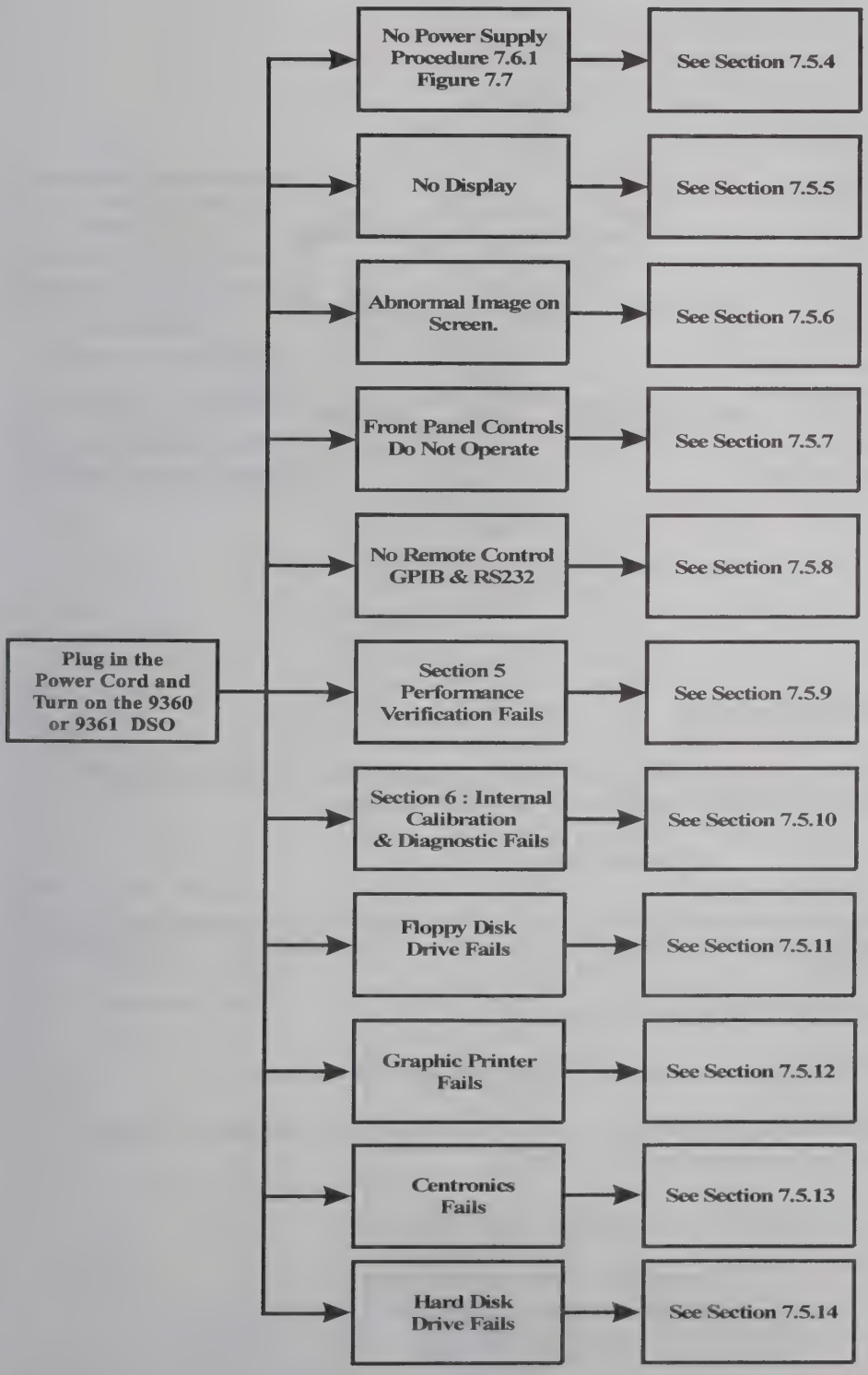
7.5.1 Introduction

The troubleshooting information contained in this section is intended for use by qualified personnel having a basic understanding of electronics (analog and digital). In order to simplify servicing and minimize downtime, the following list of possible symptoms, likely causes, and troubleshooting steps have been prepared.
The first step in troubleshooting is to check for obvious items like blown fuses.
The power supply is the next item to check before proceeding to more detailed troubleshooting, since noise or low power supply voltages can cause a variety of digital and analog problems.

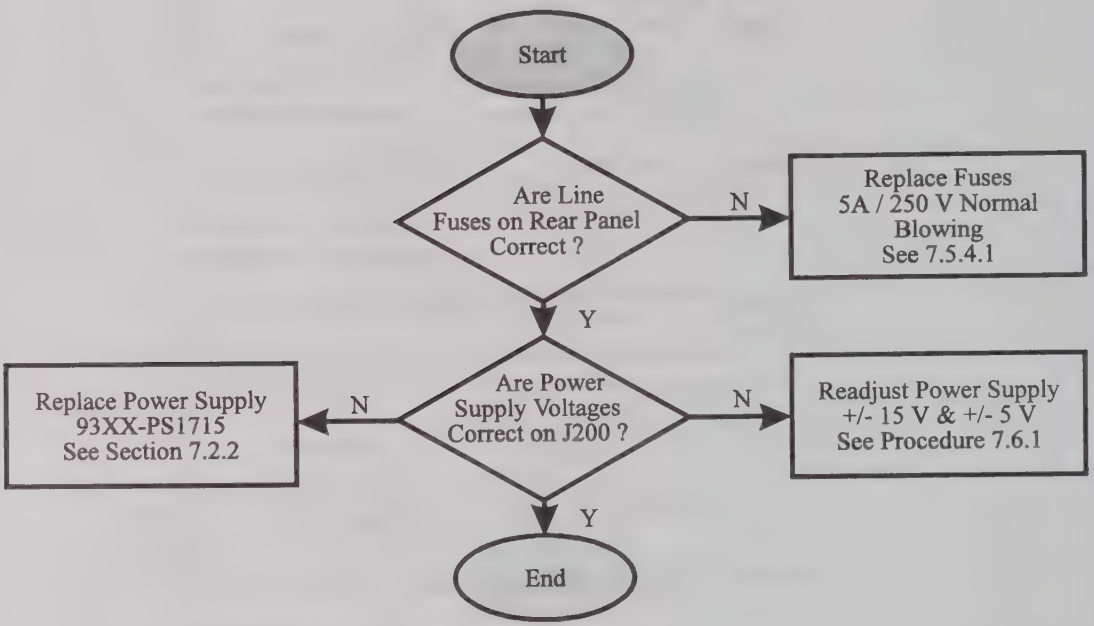
7.5.2 Line Voltage Autoranging

The 9360/61 oscilloscope operates from a 115 V (90 to 130 V) or 220 V (180 to 260 V) normal power source at 47 Hz to 63Hz.
No voltage selection is required since the instrument automatically adapts to the line voltage which is present. The instrument operates at line frequencies up to 440 Hz.

7.5.3 Initial Troubleshooting Chart



7.5.4 No Power Supply



7.5.4.1 Line Fuses Replacement

The power supply of the oscilloscope is protected against short circuits and overload by means of two 5A / 250 V fuses located above the main plugs.

WARNING

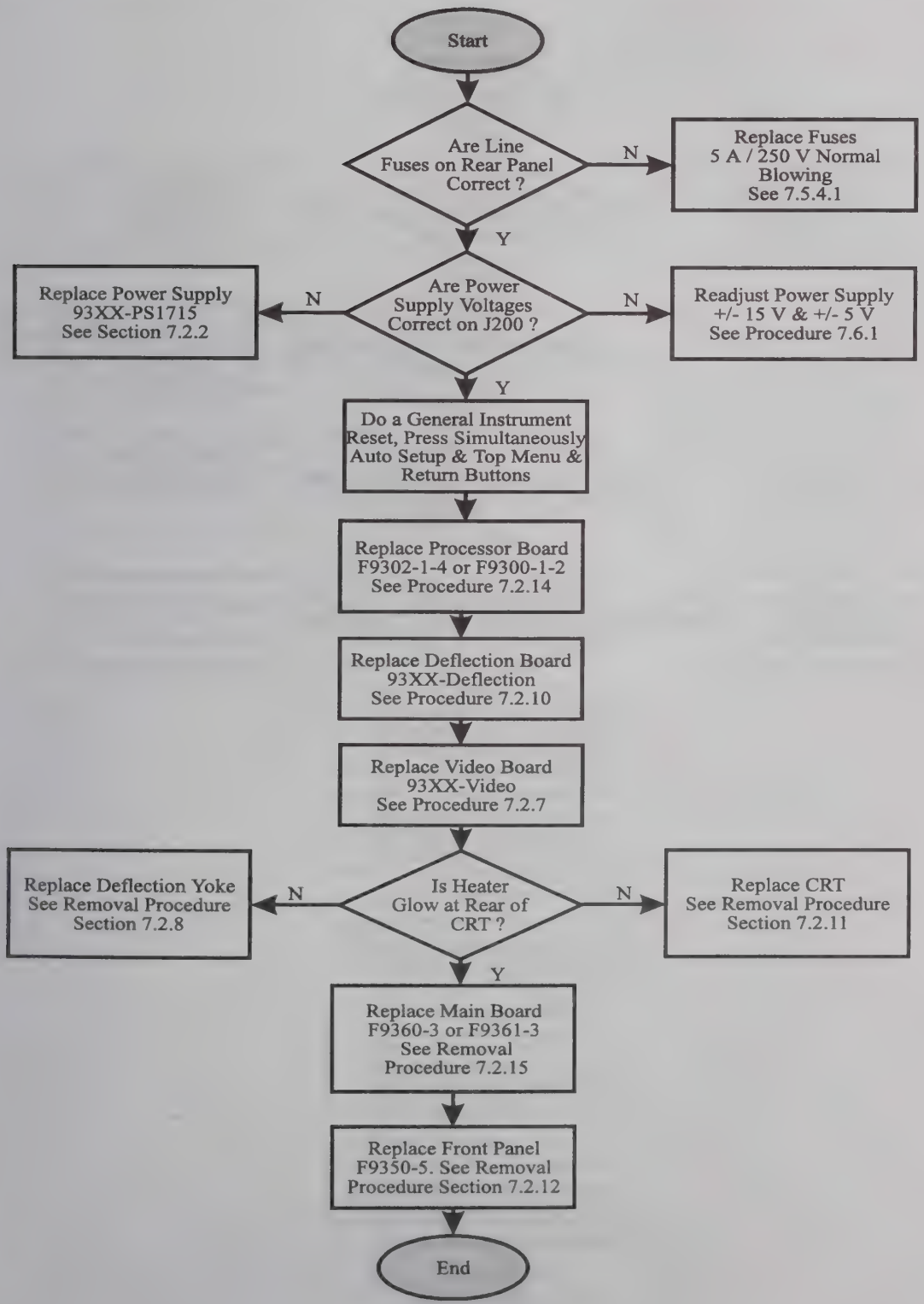
Disconnect the instrument from the power line and from other equipment before replacing fuses.

To replace line fuses, proceed as follow :

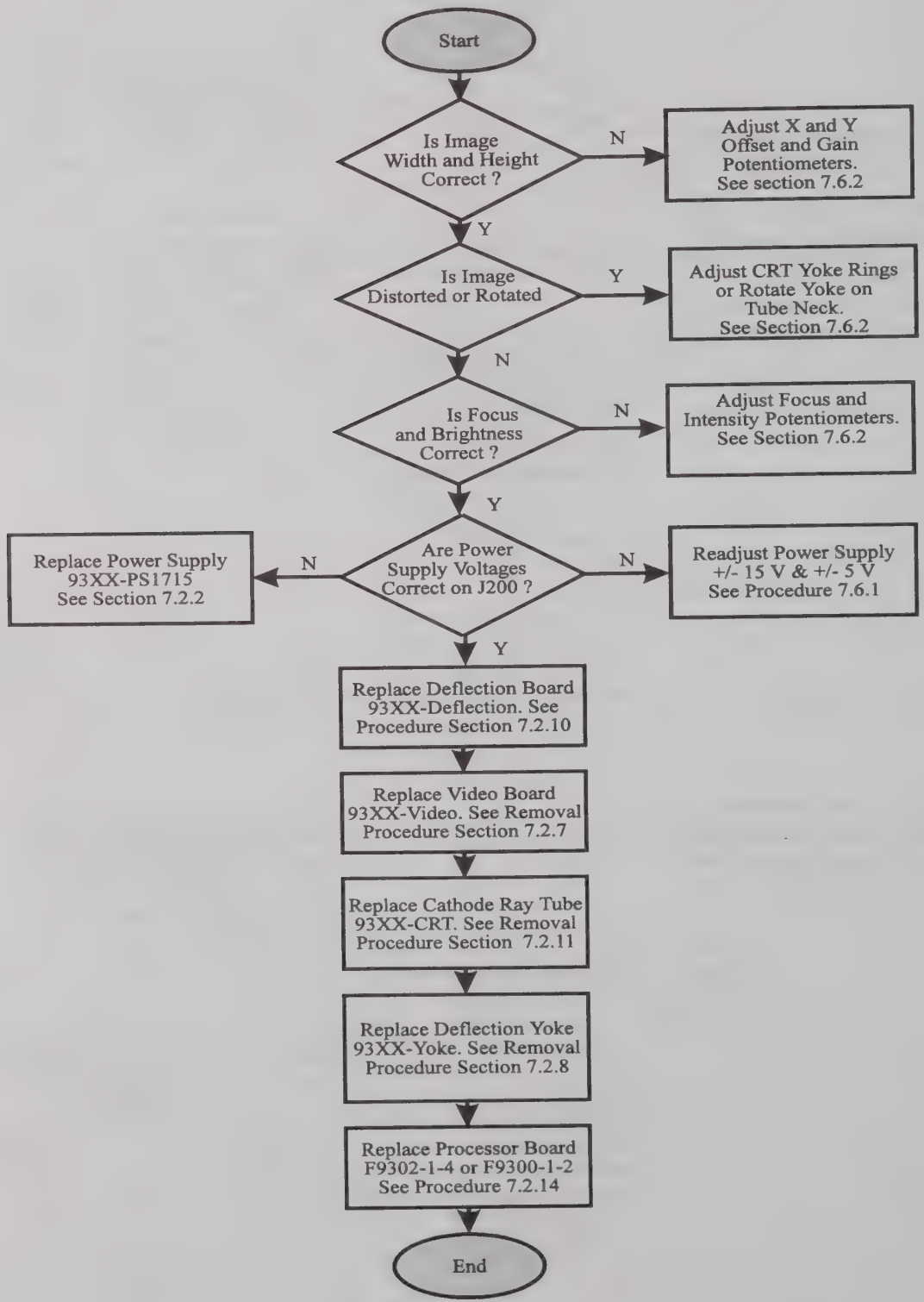
- Turn off the power and disconnect the line cord from the instrument
- Open the fuse box by inserting a small flat screwdriver under the plastic cover and remove the fuse carrier from the holder
- Remove the 5 amp fuse and replace it with the proper type:

  5 amp/250 V, 3AG normal blowing.
  LeCroy part number: 433 162 500

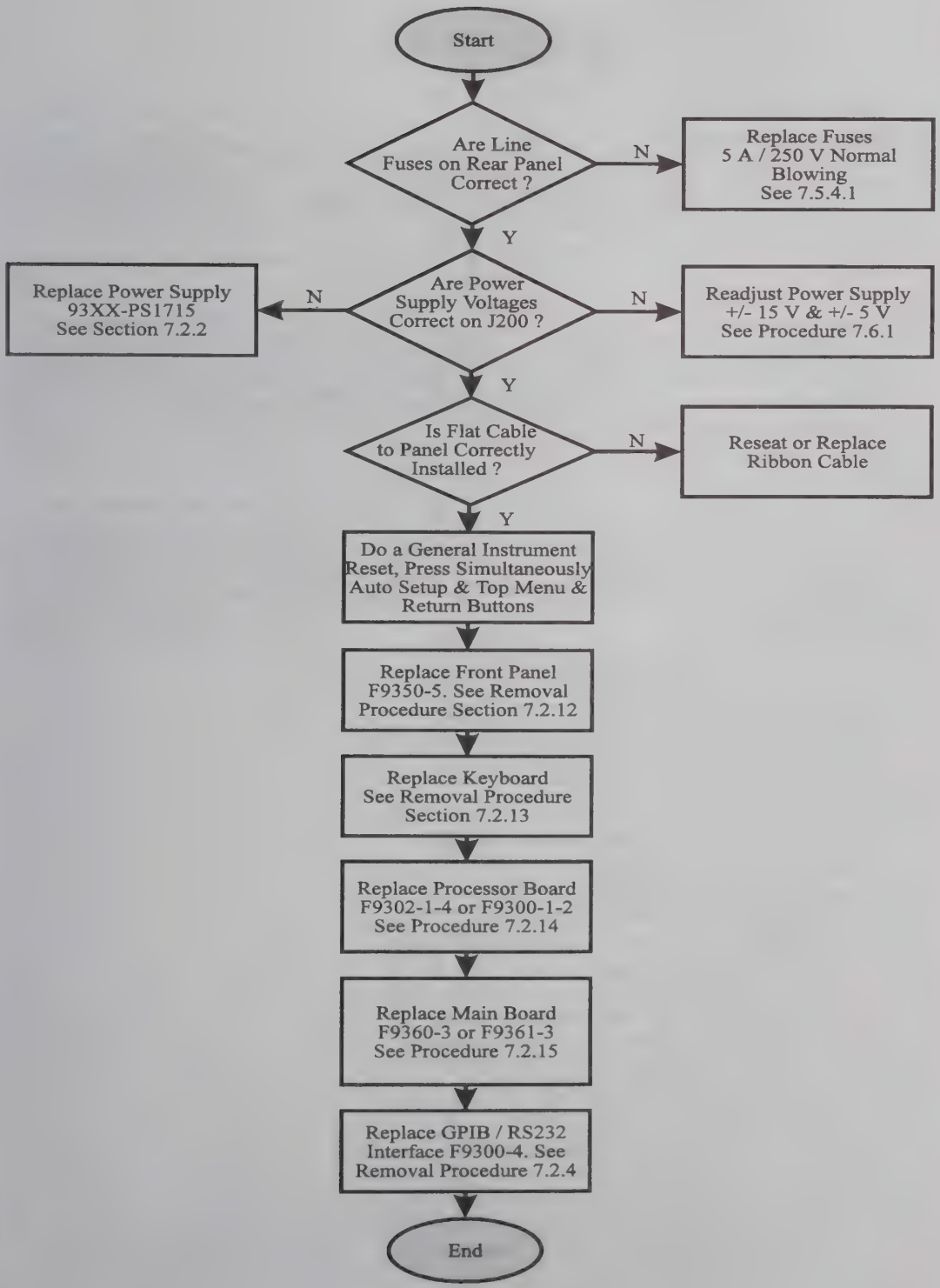
7.5.5 No Display



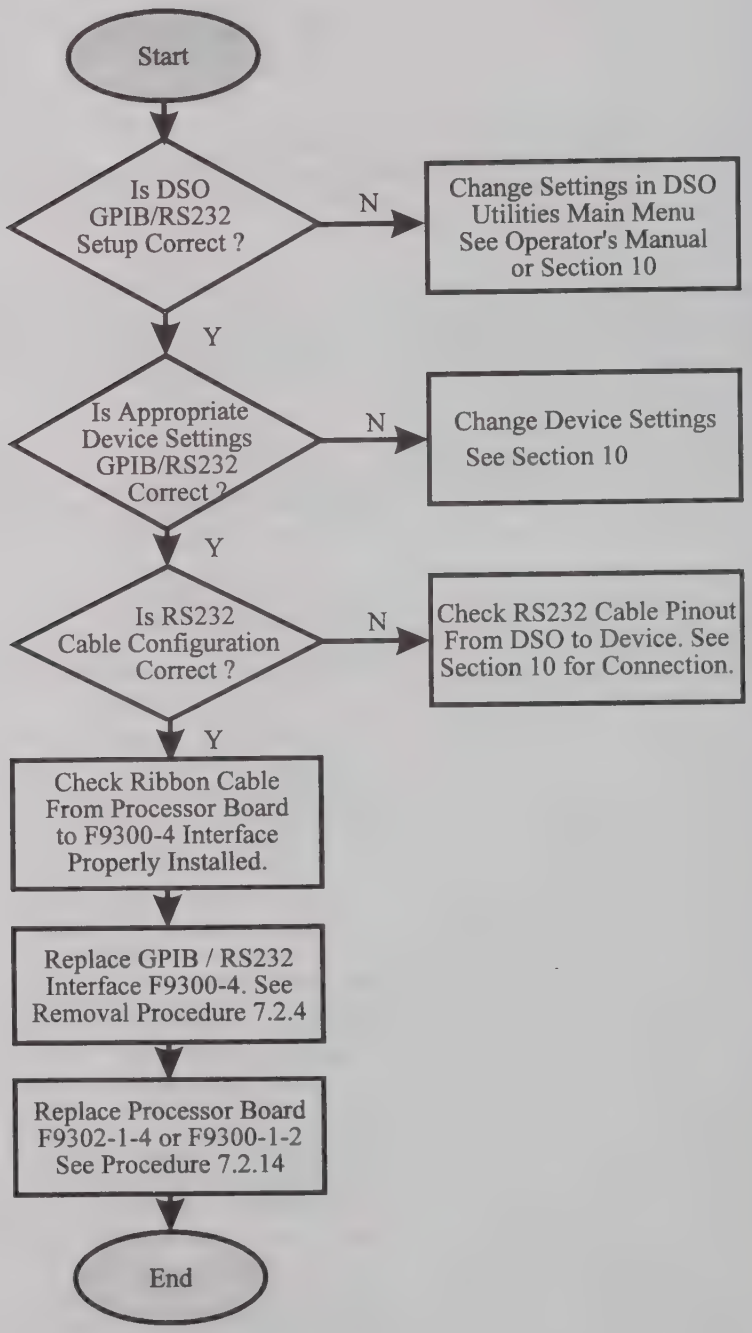
7.5.6 Abnormal Image On Screen



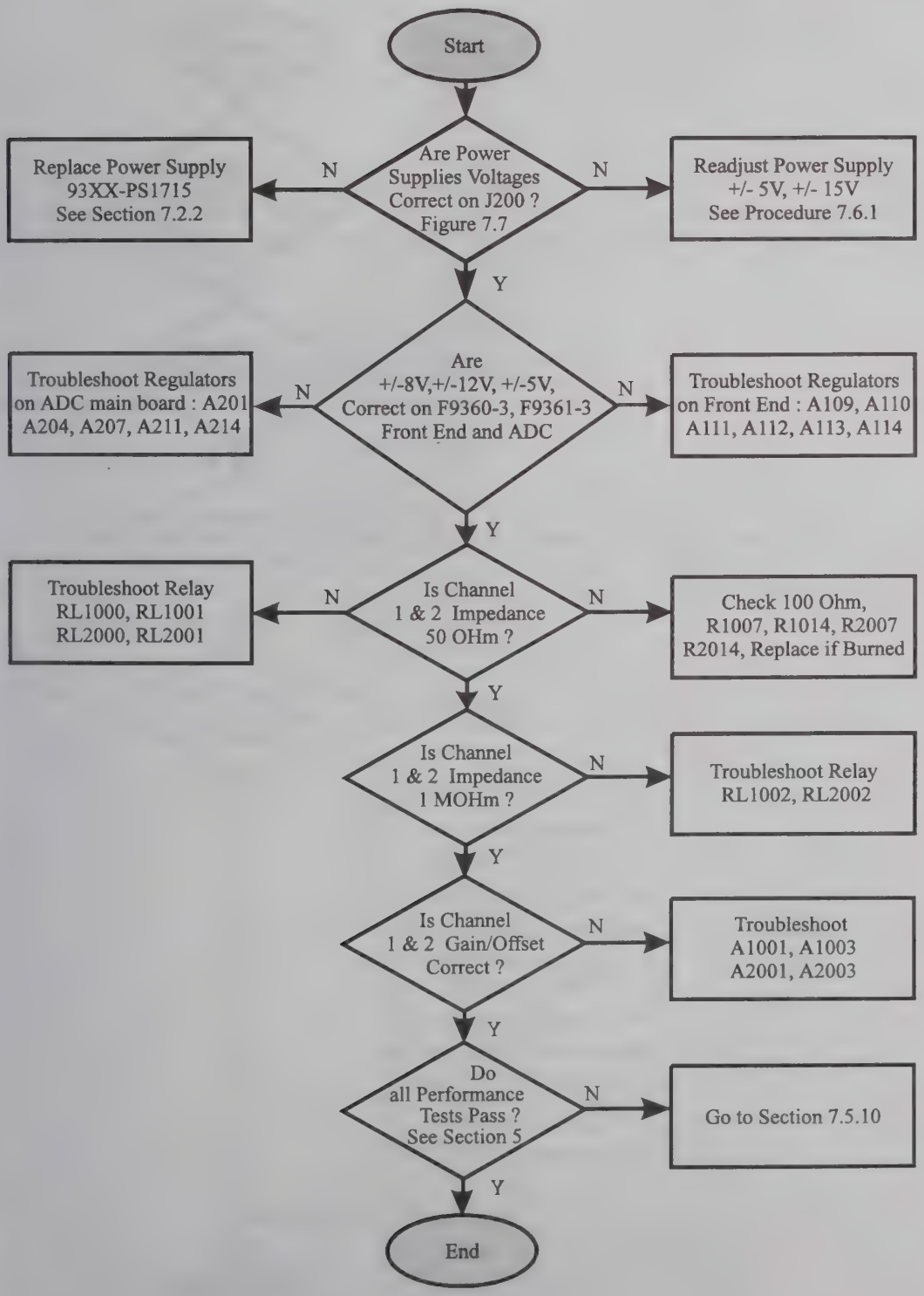
7.5.7 Front Panel Controls Do Not Operate



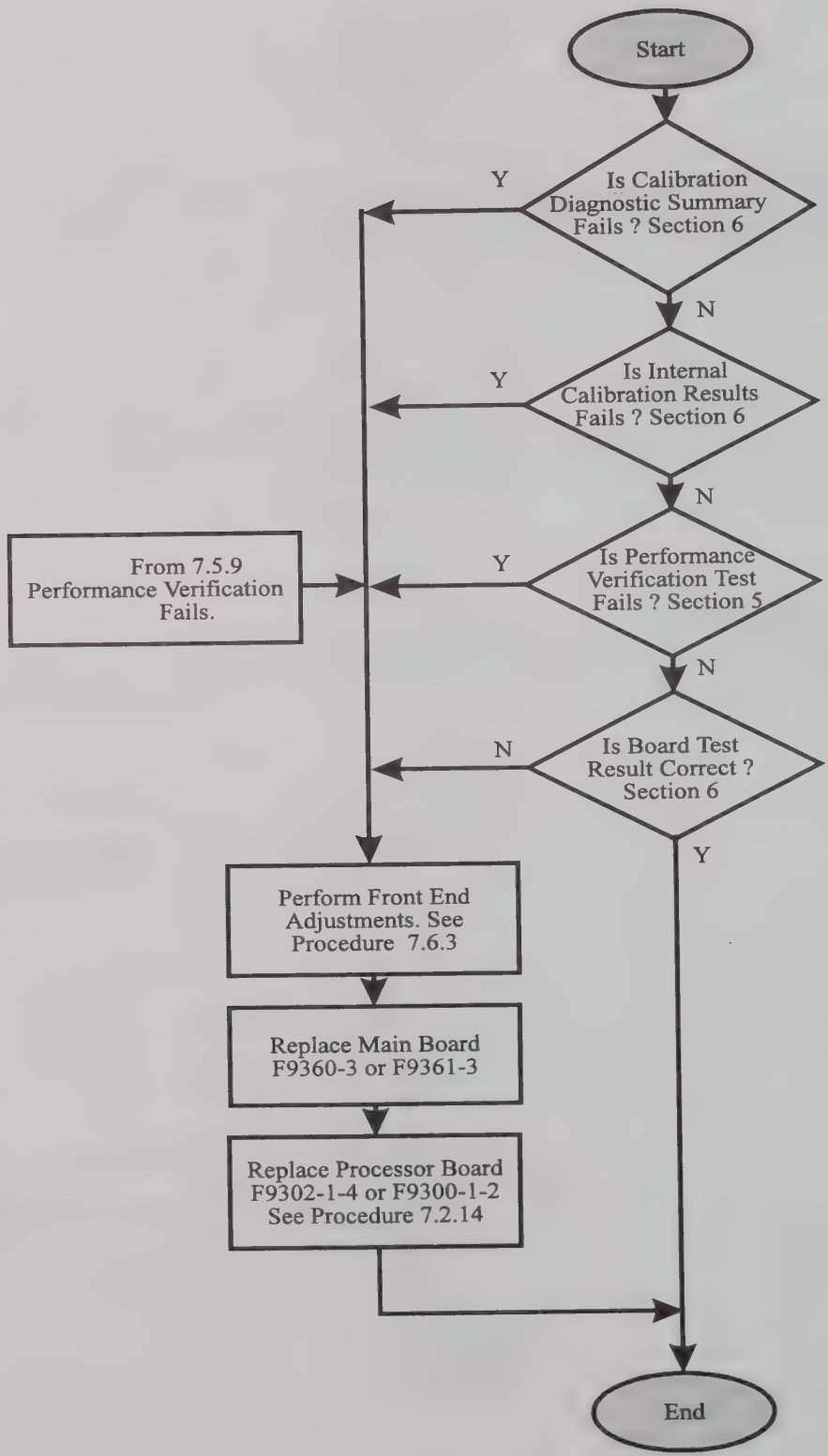
7.5.8 No Remote Control GPIB and RS232



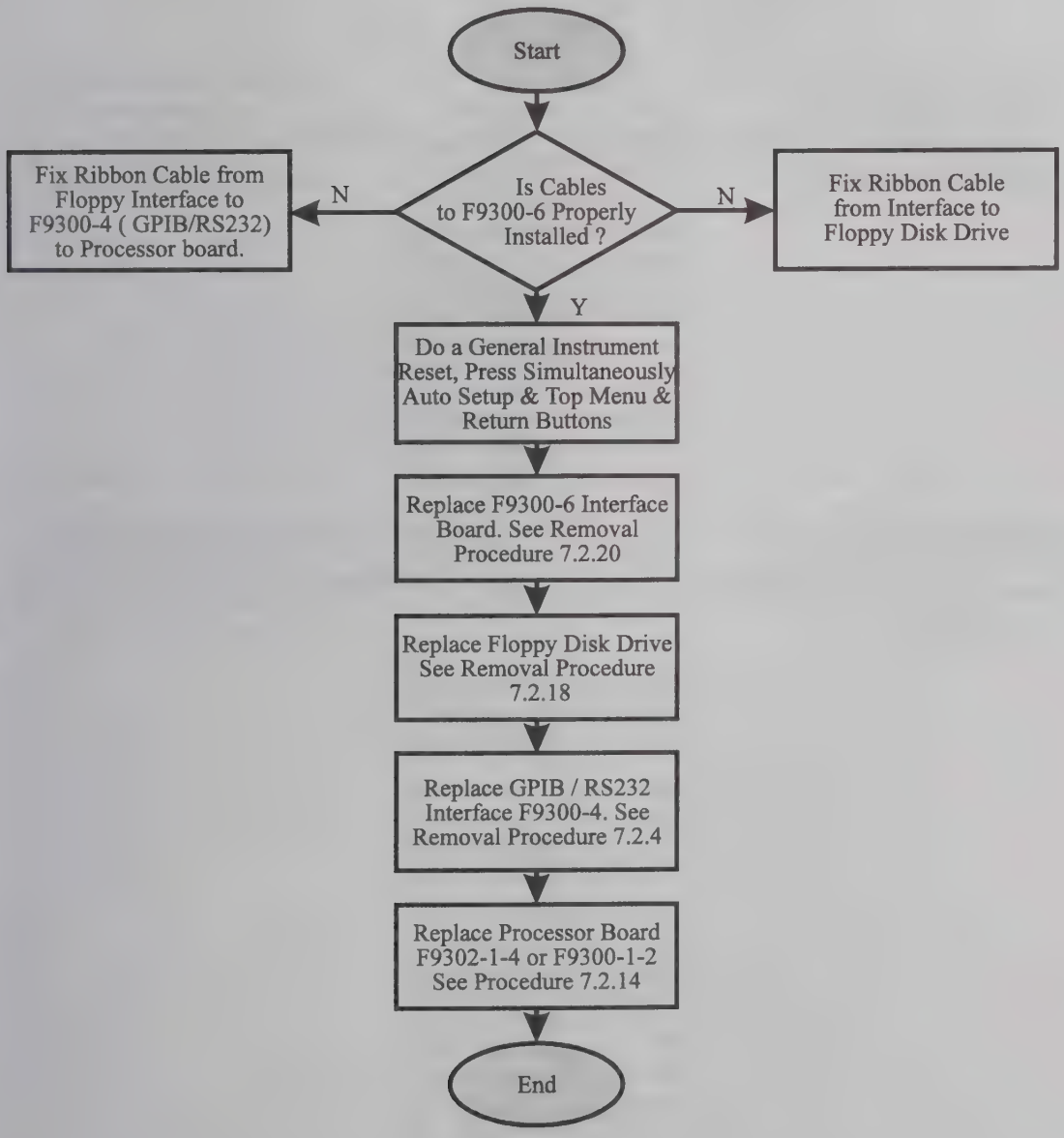
7.5.9 Performance Verification Fails



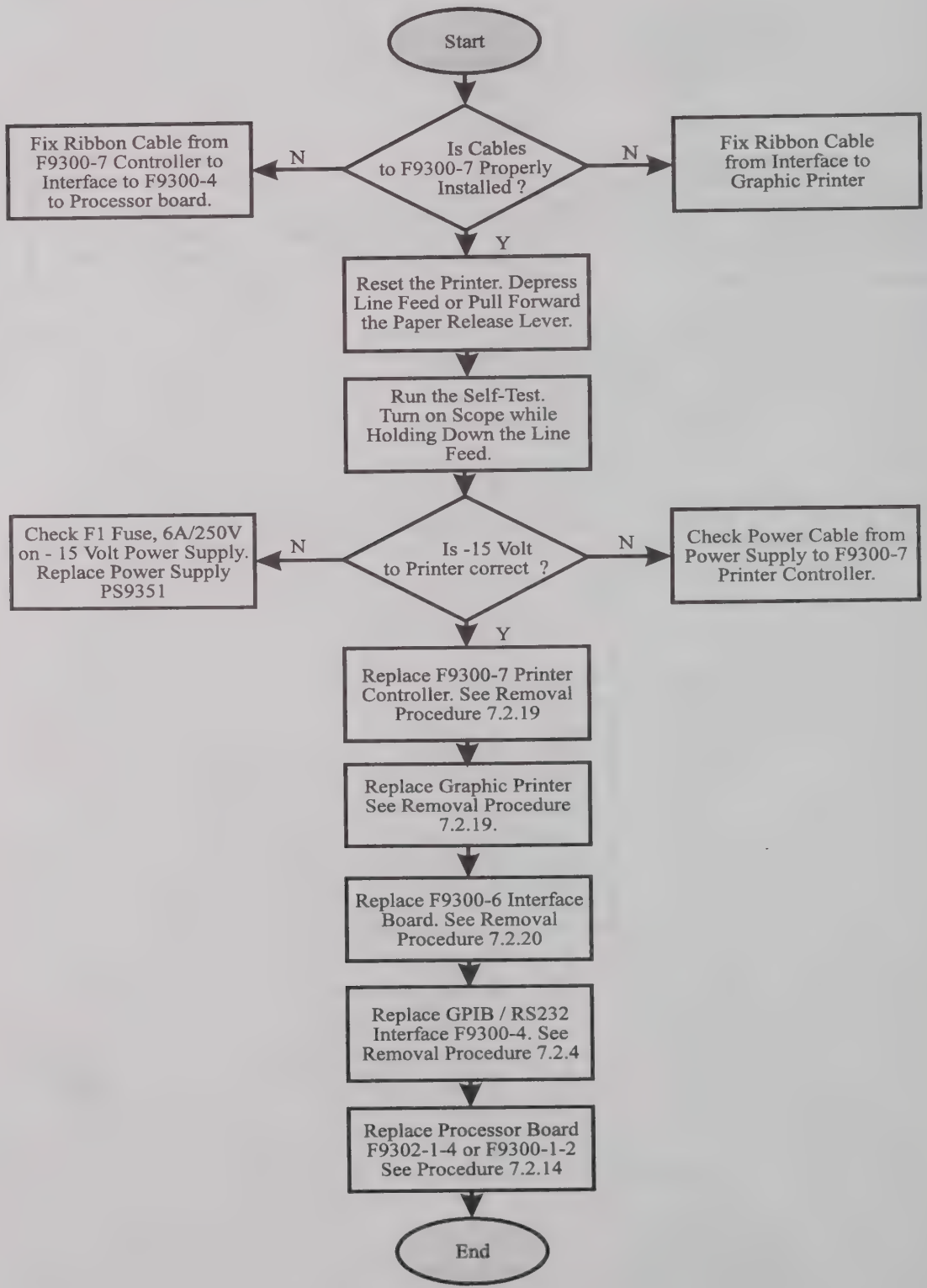
7.5.10 Internal Calibration Fails



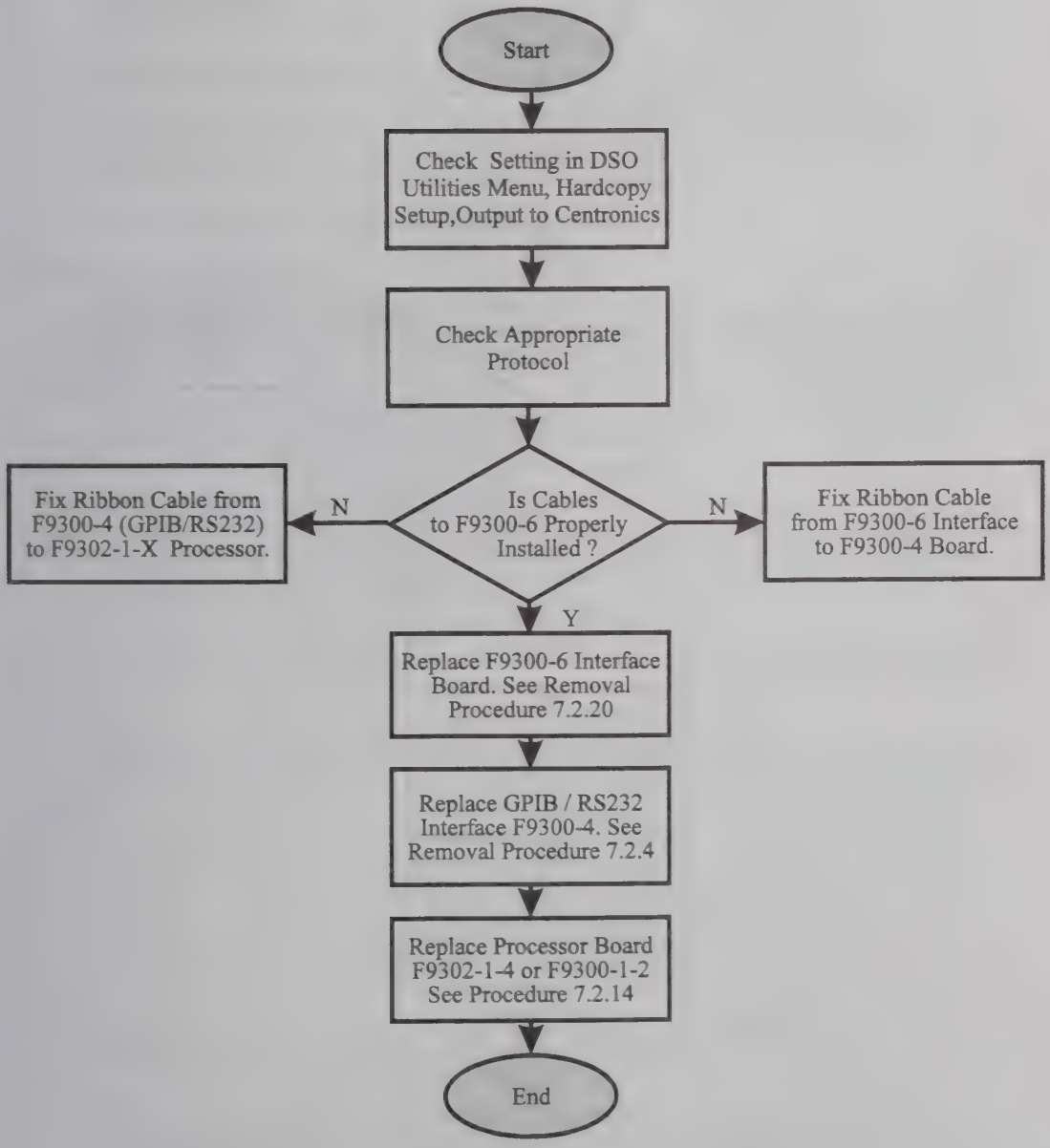
7.5.11 Floppy Disk Drive Fails



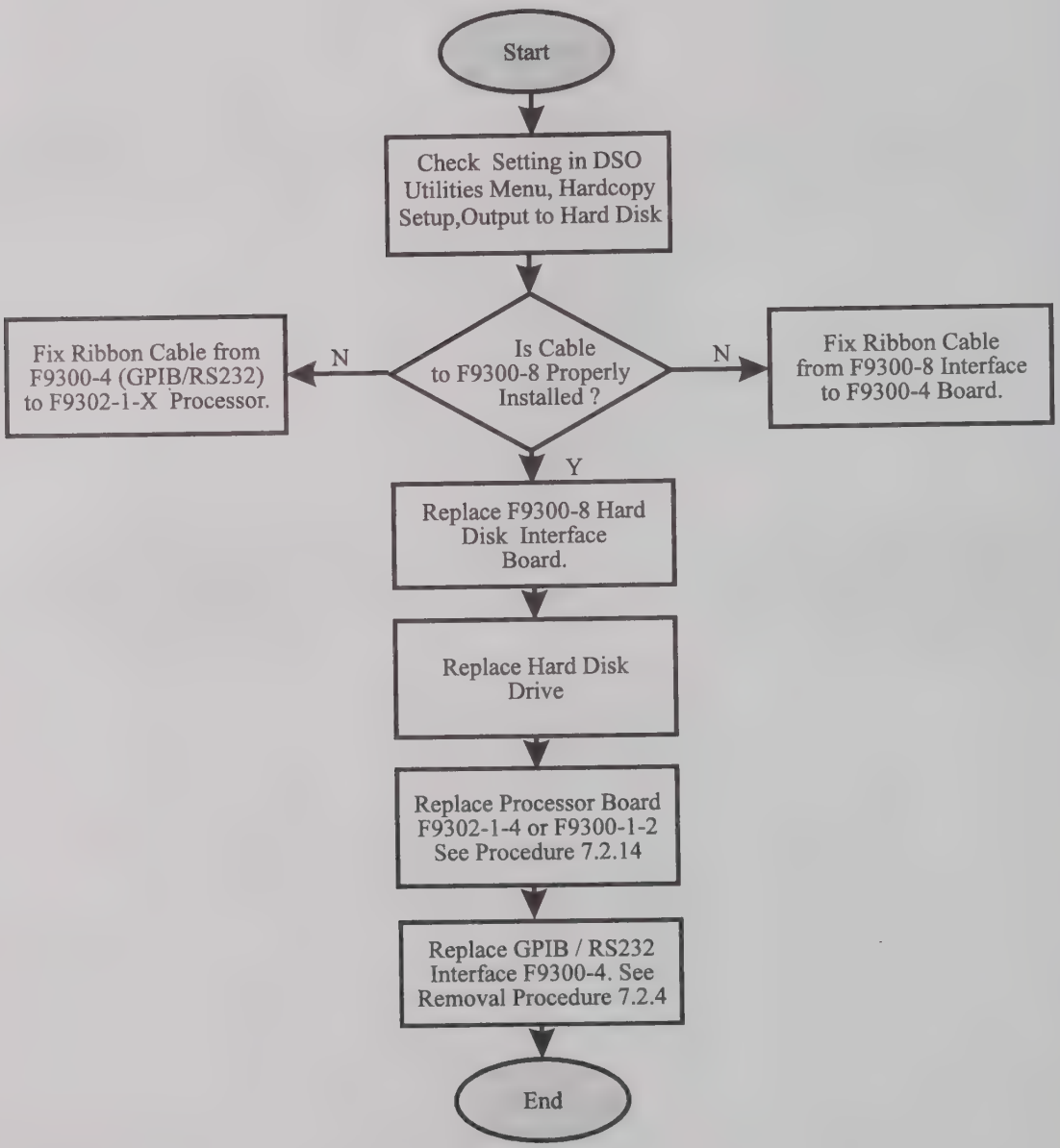
7.5.12 Graphic Printer Fails



7.5.13 Centronics Fails



7.5.14 Hard Disk Fails



7.6 Calibration Procedures

The following section includes the adjustments required for the power supply, front end and display. It is recommended that they be verified at one year intervals.

7.6.1 93XX-PS1715 Power Supply Calibration

The four voltages are adjustable by ± 5% of the nominal value.

The reference for the measurements are the pins on top of connector J200 located on the main board F9360-3 or F9361-3.

For the power supply calibration proceed as follow:

- Turn off the power
- Remove the top cover (7.2.1)
- Remove the front frame assembly (7.2.9) and put it to the right of the unit.

- By using two extension cables, reconnect the processor board to the front panel (J4) and to the deflection board (J6).

- Once the top cover is removed and the front panel is disassembled from the scope, extra cooling of the main board is required. It's mandatory to disconnect the existing Fan from connector J901, located on F9360/61-3 card, and to use a Fan with the air flow oriented to the front end section of the board.

- The front frame assembly is now reconnected to the processor through the extension cables.

- Turn on the power, set the scope to Auto Trigger, and perform the adjustments to get on J200 :

Pin 3, 5	:	+ 5.10 V (Min = + 5.05 V, Max = + 5.2 V)
Pin 7, 8	:	- 5.2 V (Min = - 5.15 V, Max = - 5.25 V)
Pin 9	:	+15 V (Min = +14.9 V, Max = +15.1 V)
Pin 10	:	- 15 V (Min = -14.9 V, Max = -15.1 V)
Pin 2, 4, 6	:	Ground

The four potentiometers R108, R206, R306, and R407 are accessible from the front through holes in the 93XX-PS1715 power supply chassis.

- Turn the potentiometer clockwise to increase the tension or counterclockwise to decrease the voltage. When the adjustment is done, stop the acquisition by depressing the stop trigger push button, and verify that there is no large difference on the + 5.10 V, typically less than 30 mV.

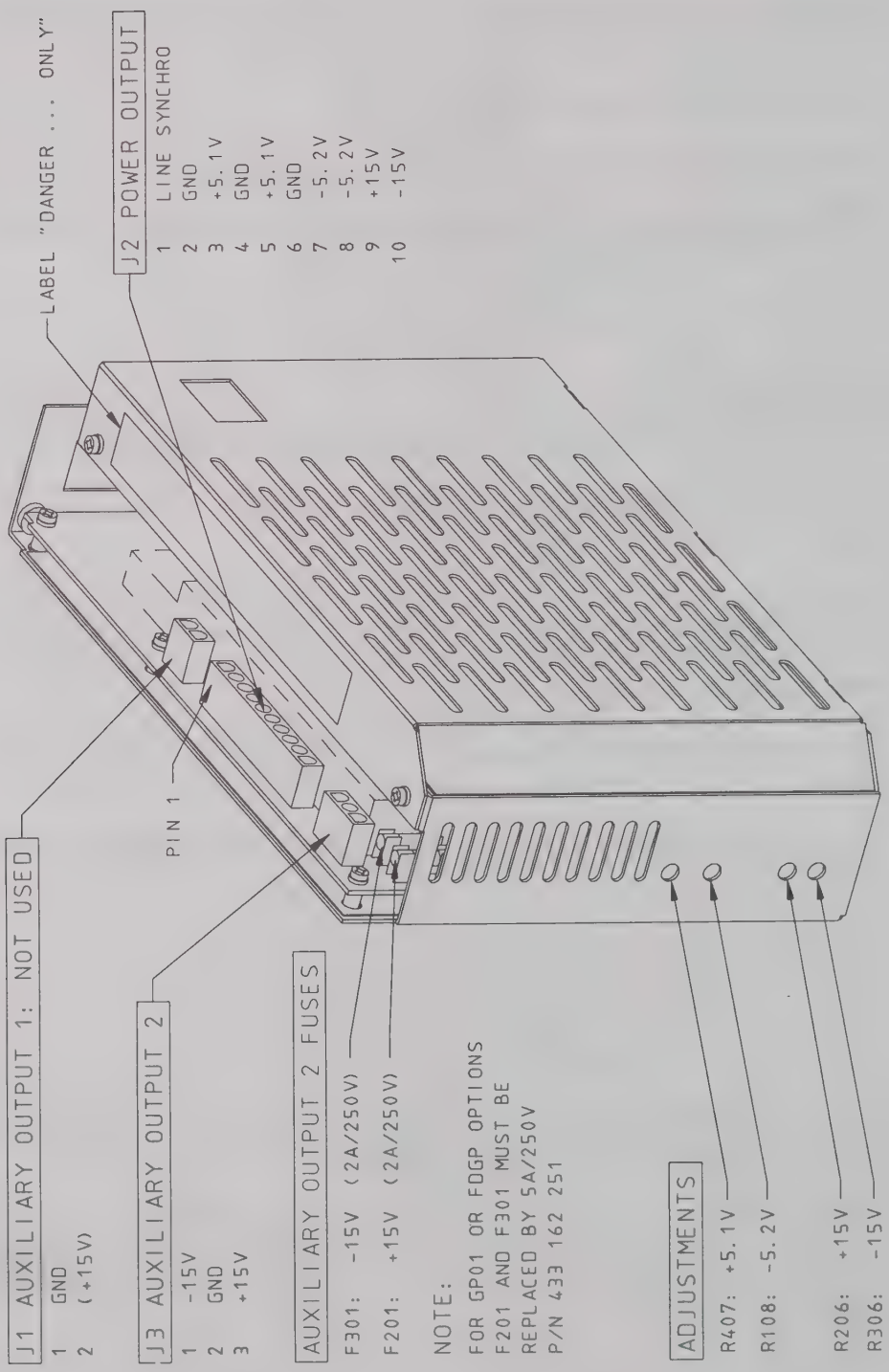


Figure 7.9 : Power Supply

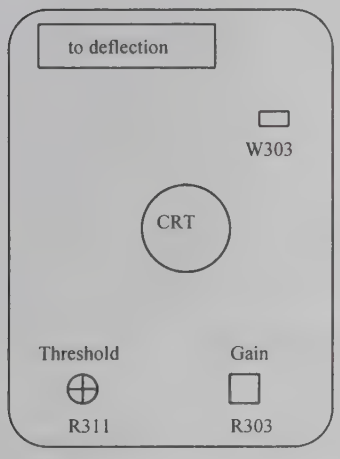
7.6.2 93XX-Display Adjustment Procedure

7.6.2.1 Introduction

There is a total of 12 potentiometers or variable coils to adjust the deflection and video board.

Video: (2 adjustments)

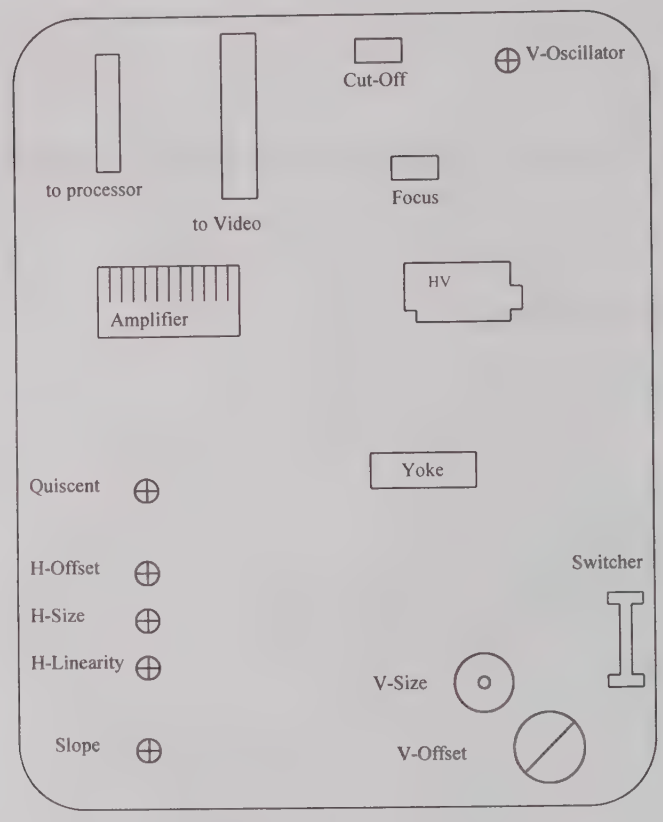
- Threshold : **Level of the video board.**
- Gain : **Intensity of the screen**.



Video board component side

Deflection : (10 adjustments)

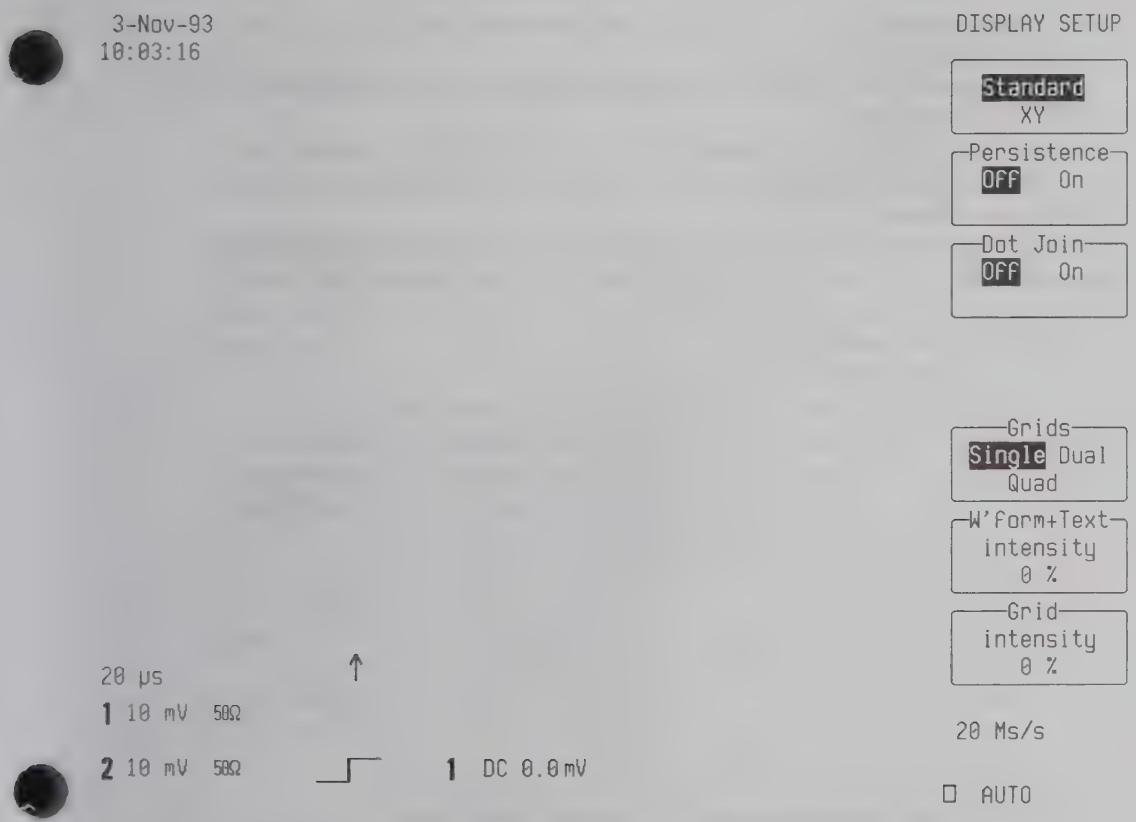
- Vosc : **Frequency of the vertical oscillator**.
- Slope : **Speed of the horizontal ramp**.
- Focus : **Focus of the screen**.
- Cut off : **Cathode ray tube cut off**.
- Quiescent : **Standby current of the horizontal deflection amplifier**.
- H Linearity : **Horizontal linearity**.
- H Size : **Horizontal size** (Max 165mm).
- H Offset : **Horizontal position**.
- V Size : **Vertical size** (Max 120mm).
- V Offset : **Vertical position**.



Deflection board component side

7.6.2.2 Coarse Adjustment

- Depress display button.
- Set W'form + text intensity to 0%.
- Set grid intensity to 0%
- Turn fully clockwise the intensity potentiometer on the video board.
- On the video board connect a digital multimeter on test point : W303
- Adjust threshold potentiometer to get 2 V ± 0.1 V on W303.



- Set W'form intensity to 100%.
- Set grid intensity to 60%.

- Adjust H-size, H-offset, V-size, V-offset to center the image in the screen.
  The vertical position should be adjusted to get the push buttons of the front panel in front of the software menus, use the utilities set up.
  The small magnets mounted on the deflection yoke influence the vertical position.

- Turn the quiescent potentiometer clockwise until the default of the horizontal lines just disappears from the vertical center of the screen.

- Increase the cut off until a vertical line appears on the right side of the screen.

- Adjust the slope potentiometer to get 5mm gap between the highlighted vertical line and the right border of the selection menus.

- Adjust H-linearity to get the best linearity.

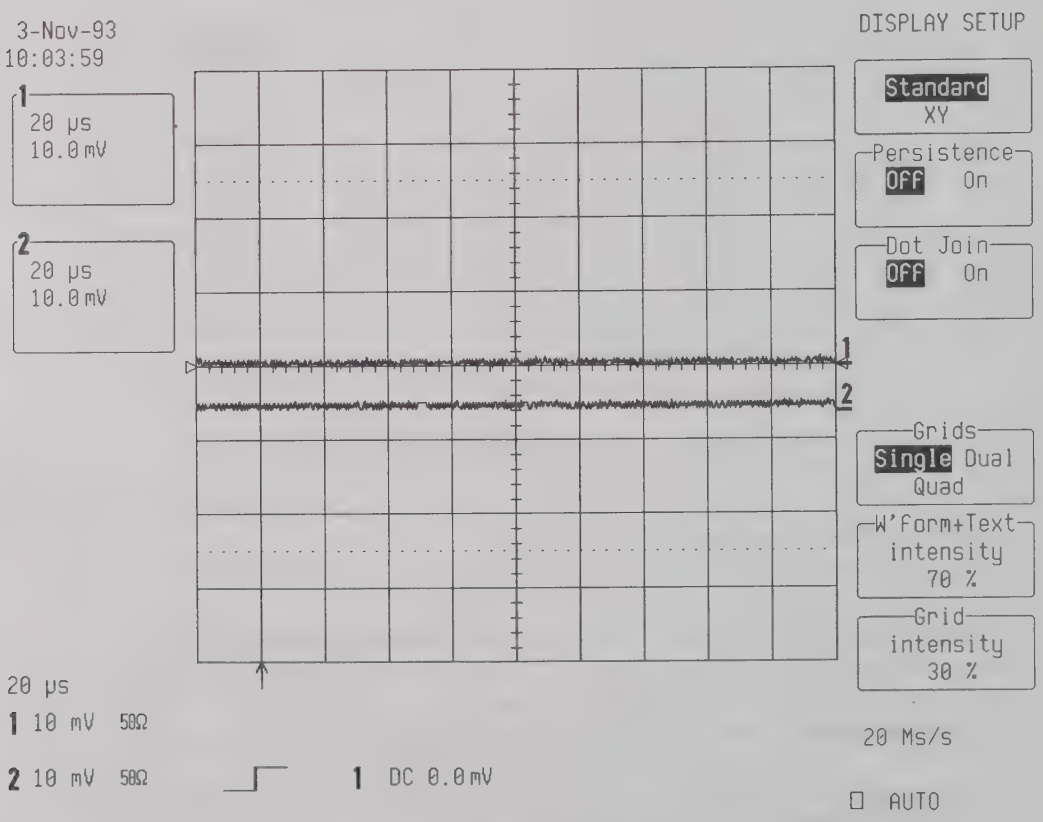
7.6.2.3 Fine Adjustment

The final adjustment of the intensity, cut off, and focus must be made in a dark room.

- Set W'form intensity to 30%.
- Set grid intensity to 0%.
- Adjust the cut off potentiometer until the highlighted vertical line disappears from the right side of the screen.

- Set W'form intensity to 20%.
- Display four traces.
- On the video board adjust the gain potentiometer (intensity) in order to get the text just readable.

- Set W'form + text intensity to 70%.
- Set grid intensity to 30%



- Adjust the focus (usually fully clockwise) for most uniform focus over the entire screen.

- In a standard luminosity environment set W'form + text to 90%, and grid intensity to 60%.

- Verify the intensity, focus, and contrast adjustment, for best definition of the displayed text.

CAUTION

Never change the Vosc calibration.

7.6.3 Front End Test and Calibration Procedure

7.6.3.1 Introduction

The adjustments describe in the following calibration procedure require extension of the front panel assembly out of the scope, using two flat cables.

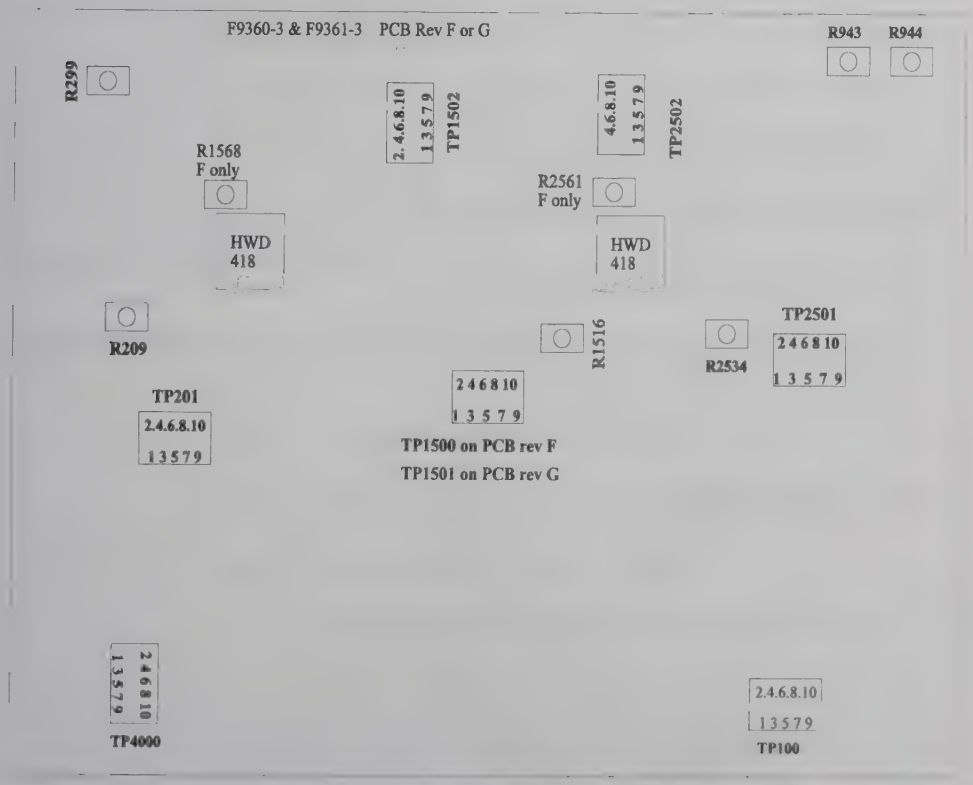
In order to access the front end potentiometers and variable caps located underneath the Cathode Ray tube and deflection board, dismount the front panel assembly from the scope and reconnect it to the processor board connectors J4 and J6, using the extension cable set.

Once the top cover is removed and the front panel is disassembled from the scope, extra cooling of the main board is required. It's mandatory to disconnect the existing Fan from connector J901, located on F9360-3 or F9361-3 card, and to use a Fan with the air flow oriented to the front end section of the board.

7.6.3.2 Power Supplies

Remove the upper shield to access the test points and potentiometers.

Use a high precision DMM.



7.6.3.2.1 Front End Power Supply Adjustment (+ 14 V)

- Check on test point TP201 pin 3 (+) and pin 1 (-) : + 14 Volt

- Adjust R209 to get 14 Volt ± 3% (min 13.58 V, max 14.42 V).

7.6.3.2.2 ADC Power Supply Adjustment (Vref)

- Check on test point TP201 pin 9 (+) and pin 1 (-) : + 2.49 Volt

- Adjust R299 to get 2.49 Volt ± 1 % (min 2.47 V, max 2.51 V).

7.6.3.2.3 HWD418 Power Supply Adjustment (Vcap) for PCB Rev F only

- Check on test point TP1502 pin 9 (+) and pin 1 (-) : + 6 Volt

- Adjust R1568 to get 6 Volt ± 2 % (min 5.88 V, max 6.12 V).

- Check on test point TP2502 pin 9 (+) and pin 1 (-) : + 6 Volt

- Adjust R2561 to get 6 Volt ± 2 % (min 5.88 V, max 6.12 V).

7.6.3.3 HWD418 Temperature Compensation

- Check on test point TP1501 for PCB rev G or TP1500 for PCB rev F:

pin 10 (+) and pin 5 (-) : - 3.32 Volt

- Adjust R1516 to get - 3.32 Volt ± 2 %

- Check on test point TP2501 pin 10 (+) and pin 5 (-) : - 3,32 Volt

- Adjust R2534 to get - 3.32 Volt ± 2 %

When the HWD418 of Channel 1 is cold, check on pin 9 (+) of test point TP1501 for PCB rev G or TP1500 for PCB rev F

VTemp = Min + 3.4 Volt, Max + 3.7 Volt

Repeat the test for Channel 2, check on test point TP2501 pin 9 (+)

VTemp = Min + 3.4 Volt, Max + 3.7 Volt

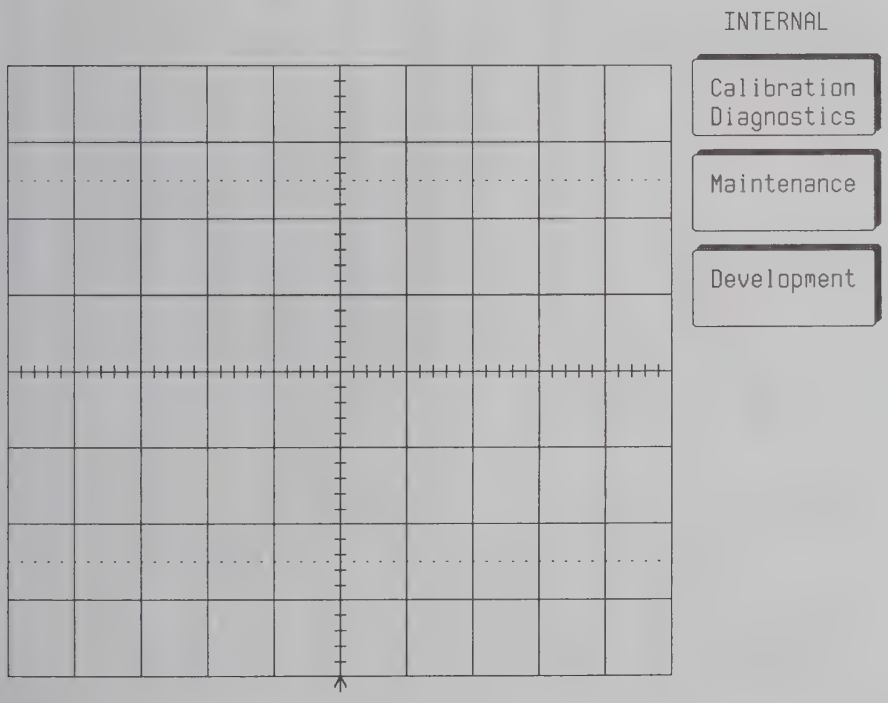
If VTemp is less than 3.0 V the HWD418 must be replaced.

7.6.3.4 16 bit DAC Calibration

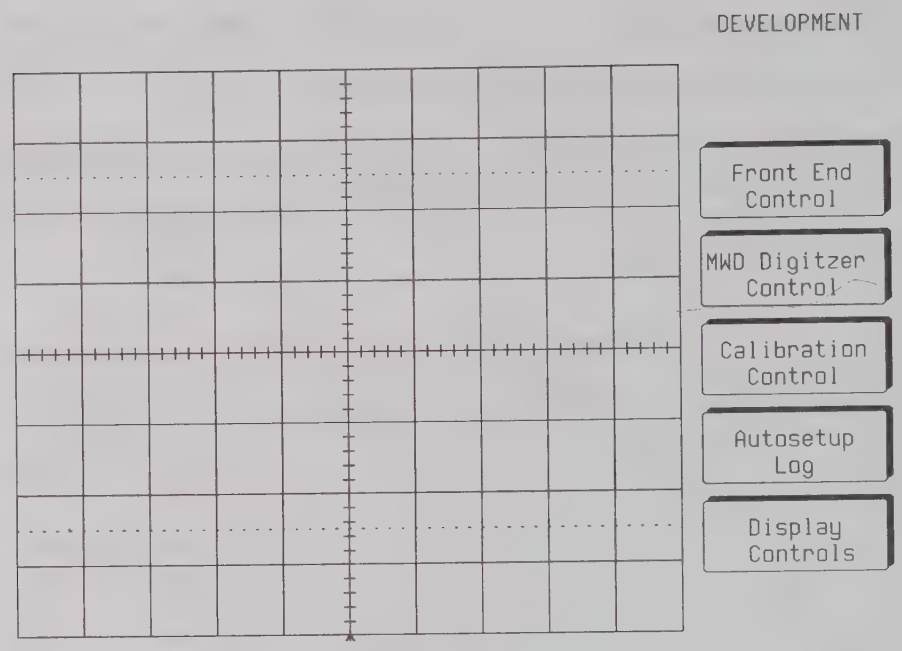
- Select Channel 1 and Channel 2 : Coupling DC 1 MΩ

Enter in the internal calibration diagnostics by simultaneously depressing the third and fourth push buttons, and then by depressing the fifth.

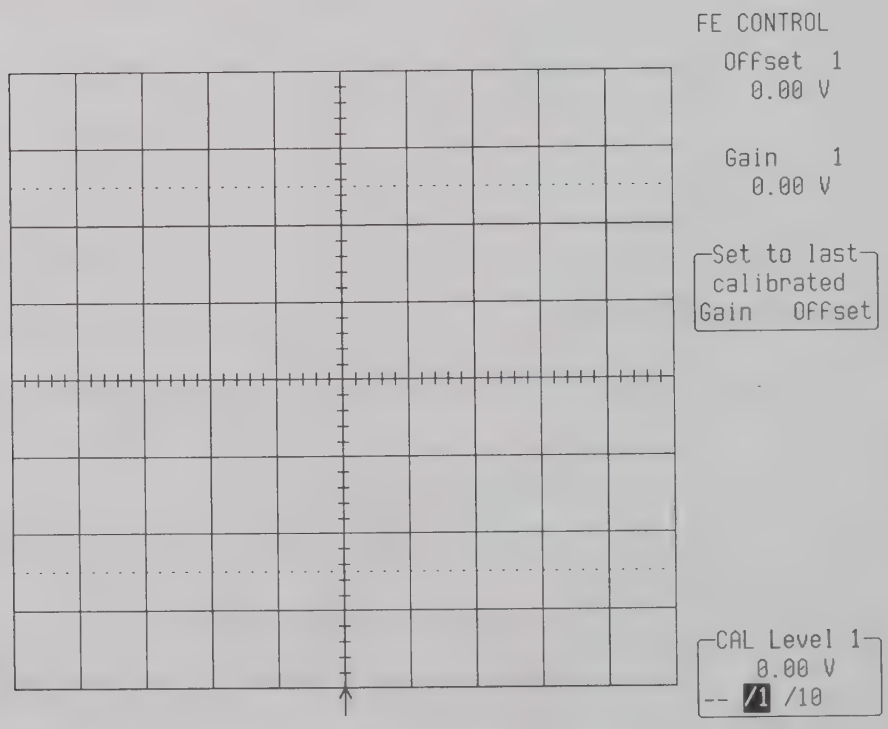
- Select Development menu



- Select Front End Control menu

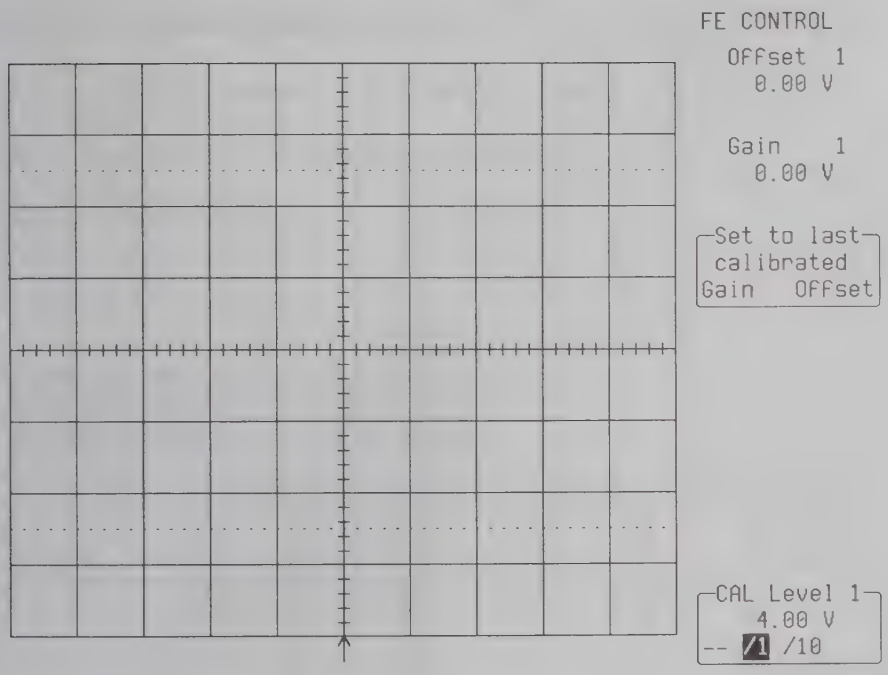


- Set Cal Level : /1 and 0,00 V



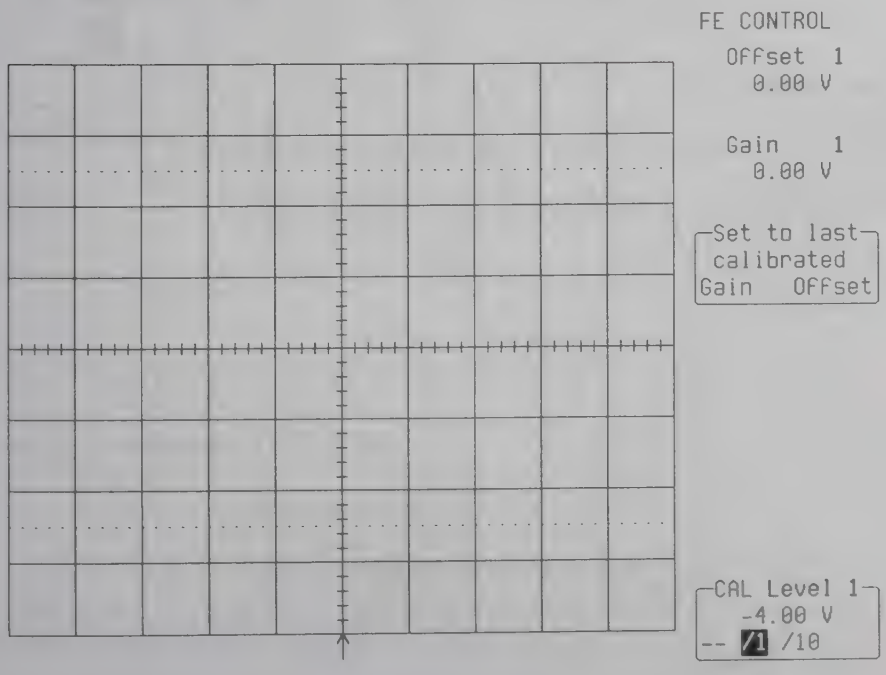
- Adjust potentiometer R943 in order to get 0.00 mV on pin 5 (+) of TP100.

- Set Cal Level : /1 and + 4.00 V (use front panel potentiometer)



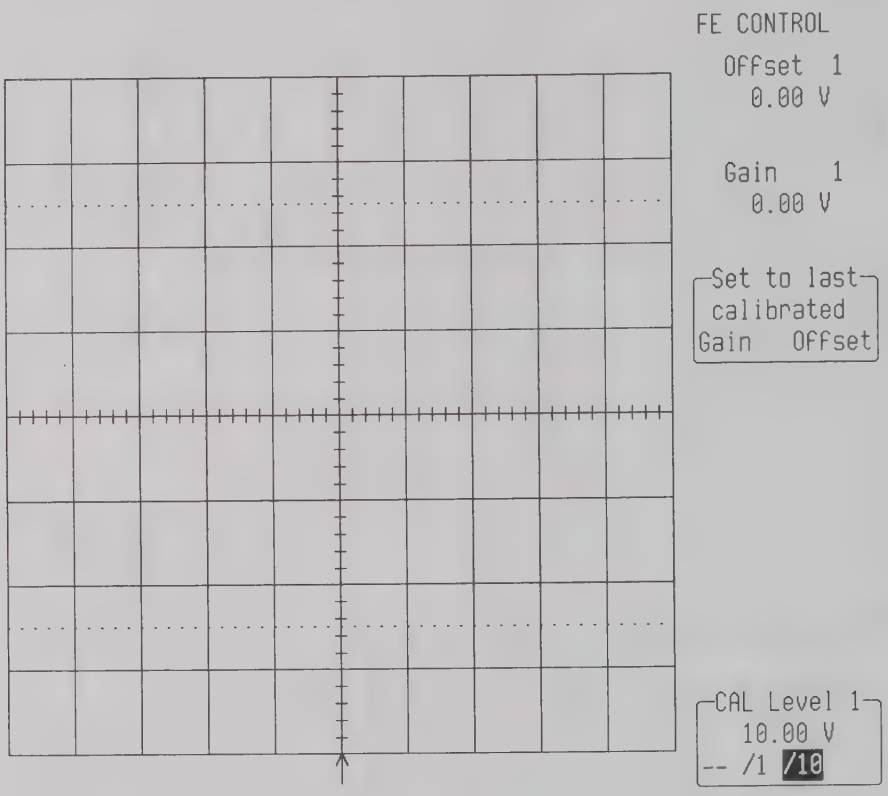
- Adjust potentiometer R944 in order to get 1.00 V ± 1% on pin 5 (+) of TP100.

- Set Cal Level : /1 and - 4.00 V (use front panel potentiometer)



- Check on pin 5 (+) of TP100 that we get - 1.00 V ± 1%

- Set Cal Level : /10 and + 10.00 V (use front panel potentiometer)



- Check on pin 5 (+) of TP100 that we get + 0.25 V ± 1%

- Set Cal Level : /10 and - 10.00 V (use front panel potentiometer)

- Check on pin 5 (+) of TP100 that we get - 0.25 V ± 1%

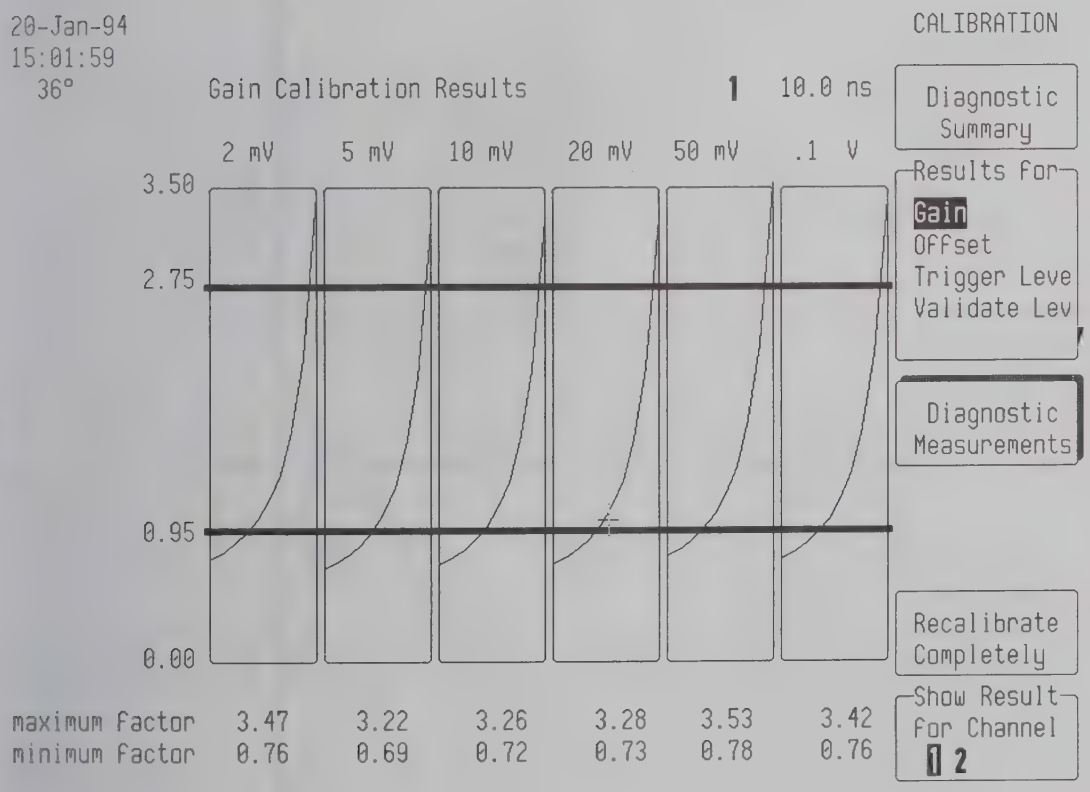
7.6.3.5 Input Buffer DC Gain Adjustment

7.6.3.5.1 Channel 1 DC Gain Adjustment

- In the Calibration Diagnostics select Diagnostics Results.

- Select Results for Gain, and Show Result for Channel 1

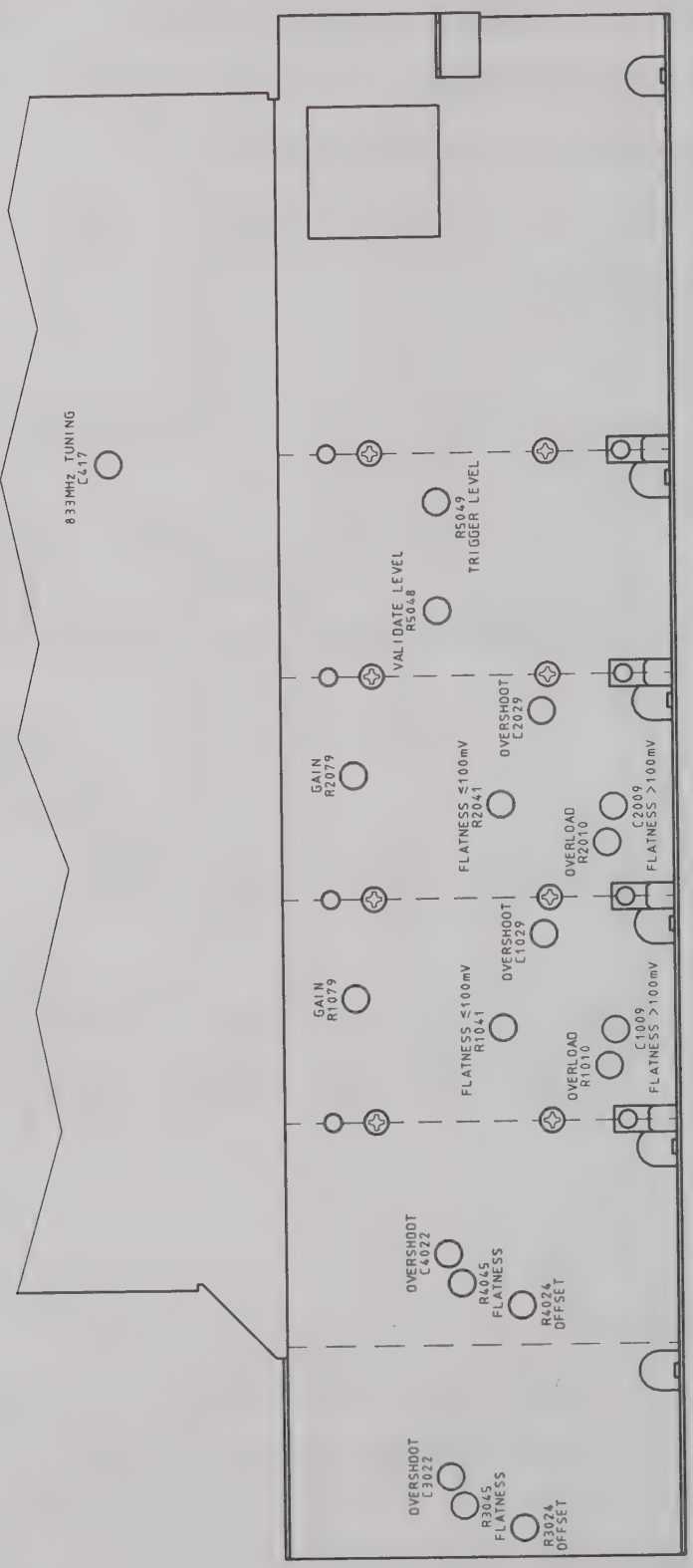
- Push Recalibrate Completely



- Adjust Potentiometer R1079 to get :

Maximum Factor at 5 mV/div > 2.90

Minimum Factor at 50 mV/div < 0.85

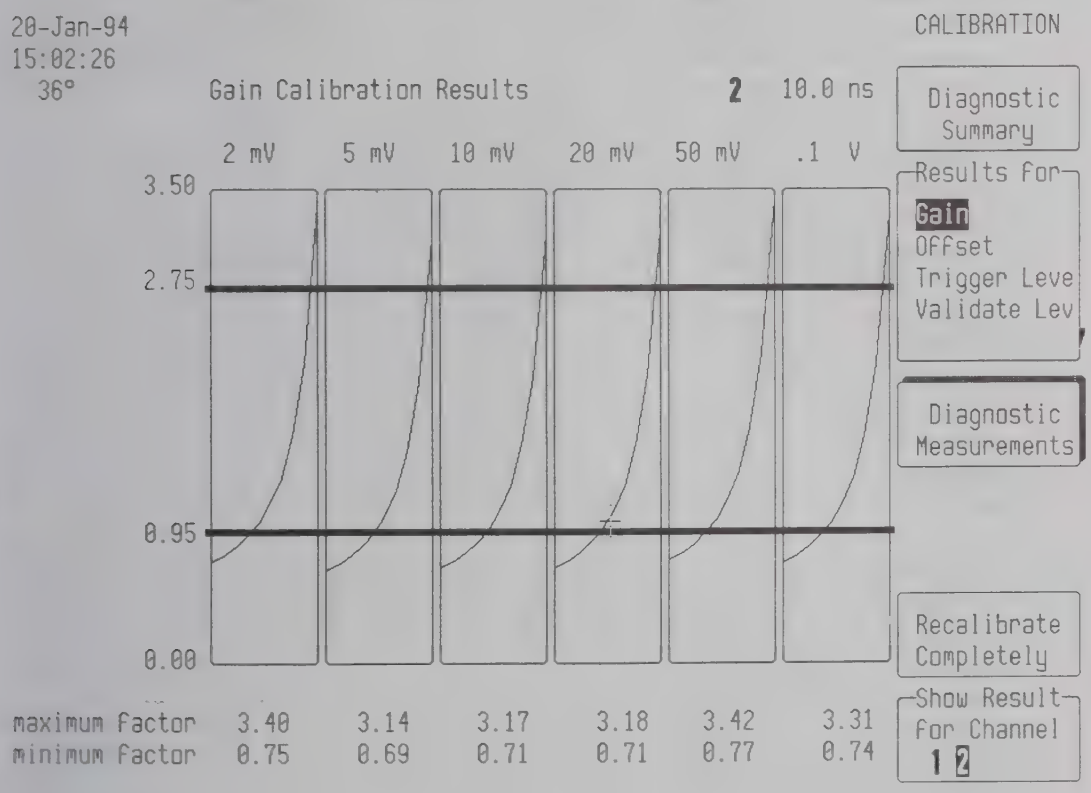

833MHz TUNING
L417
VALIDATE LEVEL
R5048
R5049
TRIGGER LEVEL
GAIN
R2079
FLATNESS <100mV
R2041
OVERSHOOT
C2029
OVERLOAD
R2010
C2009
FLATNESS >100mV
GAIN
R1079
FLATNESS <100mV
R1041
OVERSHOOT
C1029
OVERLOAD
R1010
C1009
FLATNESS >100mV
OVERSHOOT
C4022
R4045
FLATNESS
R4024
OFFSET
OVERSHOOT
C3022
R3045
FLATNESS
R3024
OFFSET
CH1 HIBW
CH2 HIBW
CHANNEL 1
CHANNEL 2
TRIGGER

7.6.3.5.2 Channel 2 DC Gain Adjustment

- In the Calibration Diagnostics select Diagnostics Results.

- Select Results for Gain, and Show Result for Channel 2

- Push Recalibrate Completely



- Adjust Potentiometer R2079 to get :

Maximum Factor at 5 mV/div > 2.90

Minimum Factor at 50 mV/div < 0.85

7.6.3.6 Overshoot Adjustment

7.6.3.6.1 Channel 1 Overshoot Adjustment

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 1 300 MHz normal input.

- Turn on trace : Ch1
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Input Channel 1 : Normal
- Coupling Channel 1 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1
- Input offset : - 250 mV
- Input gain : 100 mV/div
- Trigger setup : Edge
- Trigger on : 1
- Trigger level : DC 250 mV
- Coupling 1 : DC
- Slope 1 : Pos
- Mode : Normal
- Holdoff : Off
- Timebase : 2 nsec/div
- Delay : 50 % Pre-Trigger
- Turn on trace : A
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine A
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 1
- Turn off trace : Channel 1

- Cursors/Measure : Parameters
- Mode : Custom
- Statistics : on
- Change Parameters :
- on displayed trace : A
- On line 1 :
- Measure : Over + of A
- On line 2 :
- Measure : Rise of A

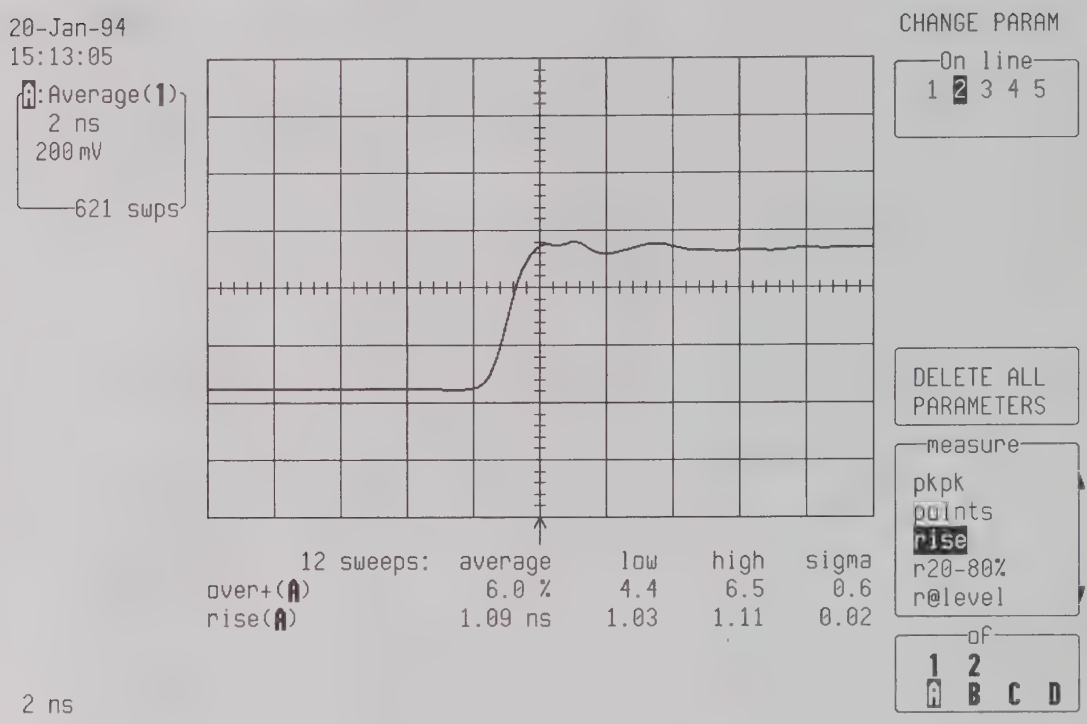
Adjust C1029 to get 5 % Overshoot

- Check that rise time is less than 1.1 nsec

20-Jan-94
15:08:10
SETUP OF A
use Math?
No Yes
Math Type
Arithmetic
Average
Functions
A:Average(1)
2 ns
100 mV
1000 swps
Avg Type
Summed
For
1000
(sweeps)
of
1 2 B C D
M1 M2 M3 M4
20 sweeps: average low high sigma
over+(A) 5.3 % 4.8 6.4 0.4
rise(A) 0.92 ns 0.82 0.97 0.03
2 ns
1 .1 V 50Ω
2 .1 V DC
A:Average(1)
100 points
NORMAL
5 Gs/s

20-Jan-94
15:07:36
CHANGE PARAM
On line
1 2 3 4 5
A:Average(1)
2 ns
100 mV
1000 swps
DELETE ALL
PARAMETERS
measure
median
minimum
over+
over-
period
of
1 2
A B C D
20 sweeps: average low high sigma
over+(A) 5.3 % 4.8 6.4 0.4
rise(A) 0.92 ns 0.82 0.97 0.03
2 ns
1 .1 V 50Ω
2 .1 V DC
1 DC 250 mV
NORMAL
5 Gs/s

- Select Input gain : 200 mV/div



- Check that overshoot is typically 10 %

- Check that rise time is typically 1.1 nsec

7.6.3.6.2 Channel 2 Overshoot Adjustment

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 2, 300 MHz normal input.

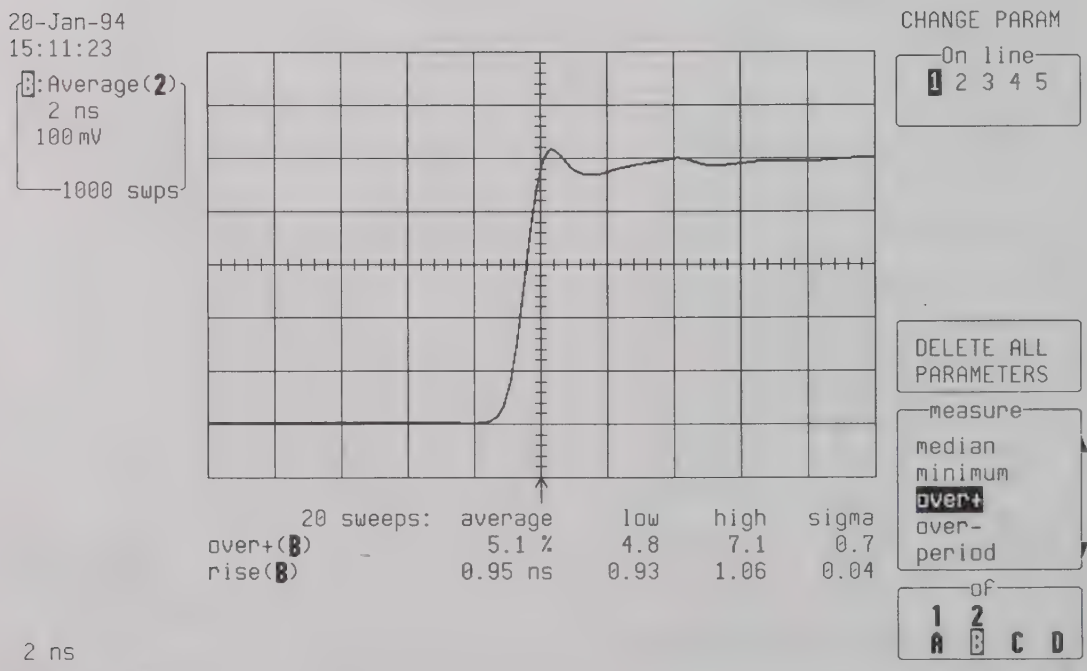
- Turn on trace : Ch2
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Input Channel 2 : Normal
- Coupling Channel 2 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1
- Input offset : - 250 mV
- Input gain : 100 mV/div
- Trigger setup : Edge
- Trigger on : 2
- Trigger level : DC 250 mV
- Coupling 2 : DC
- Slope 2 : Pos
- Mode : Normal
- Holdoff : Off
- Timebase : 2 nsec/div
- Delay : 50 % Pre-Trigger
- Turn on trace : B
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine B
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 2
- Turn off trace : Channel 2

- Cursors/Measure : Parameters
- Mode : Custom
- Statistics : On
- Change Parameters :
- On displayed trace : B
- On line 1 :
- Measure : Over + of B
- On line 2 :
- Measure : Rise of B

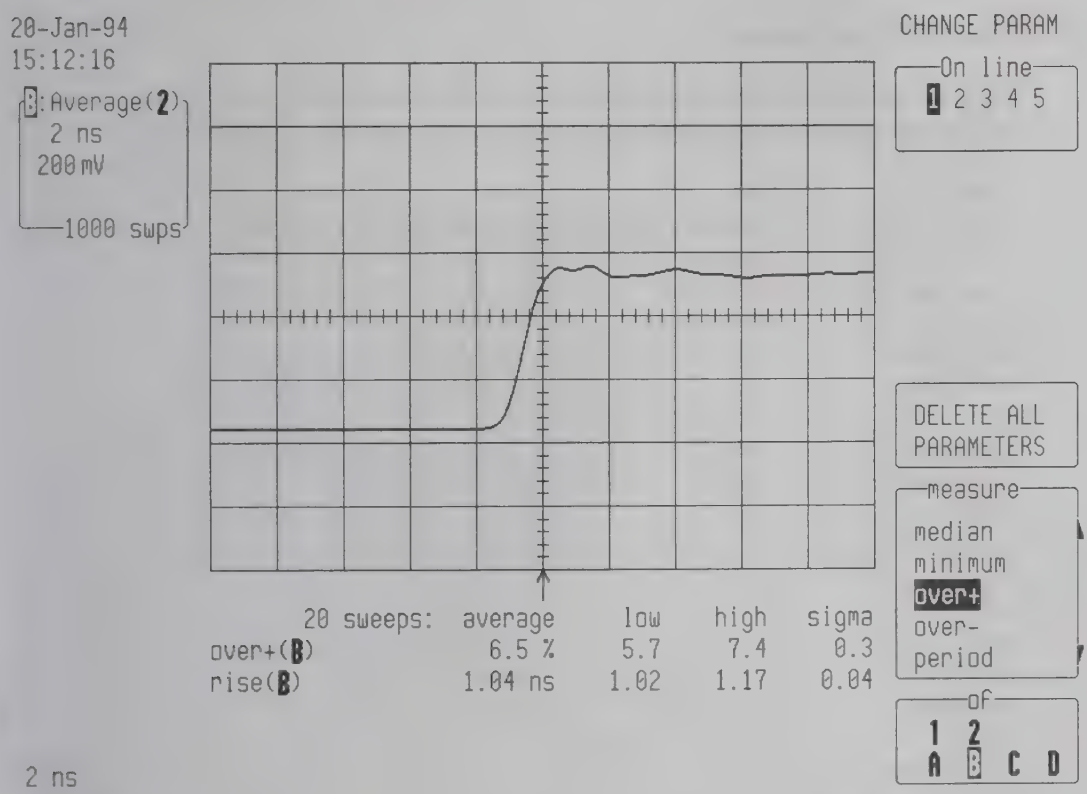
Adjust C2029 to get 5 % Overshoot

- Check that rise time is less than 1.1 nsec

20-Jan-94
15:10:17
B:Average(2)
2 ns
100 mV
762 swps
SETUP OF B
use Math?
No Yes
Math Type
Arithmetic
Average
Functions
Avg Type
Summed
For
1000
(sweeps)
of
1 2 A C D
M1 M2 M3 M4
15 sweeps: average low high sigma
over+(B) 5.6 % 3.3 6.3 0.7
rise(B) 0.92 ns 0.80 0.94 0.04
2 ns
1 .1 V 50Ω
2 .1 V 50Ω
B:Average(2)
100 points
NORMAL
5 Gs/s


20-Jan-94
15:11:23
B:Average(2)
2 ns
100 mV
1000 swps
CHANGE PARAM
On line
1 2 3 4 5
DELETE ALL
PARAMETERS
measure
median
minimum
over+
over-
period
of
1 2
A B C D
20 sweeps: average low high sigma
over+(B) 5.1 % 4.8 7.1 0.7
rise(B) 0.95 ns 0.93 1.06 0.04
2 ns
1 .1 V 50Ω
2 .1 V 50Ω
2 DC 250 mV
NORMAL
5 Gs/s

- Select Input gain : 200 mV/div



- Check that overshoot is typically 10 %

- Check that rise time is typically 1.1 nsec

7.6.3.7 Flatness Adjustment

7.6.3.7.1 Channel 1 HF Adjustment

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 1 300 MHz normal input. Set pulser to 62.5 msec low frequency.

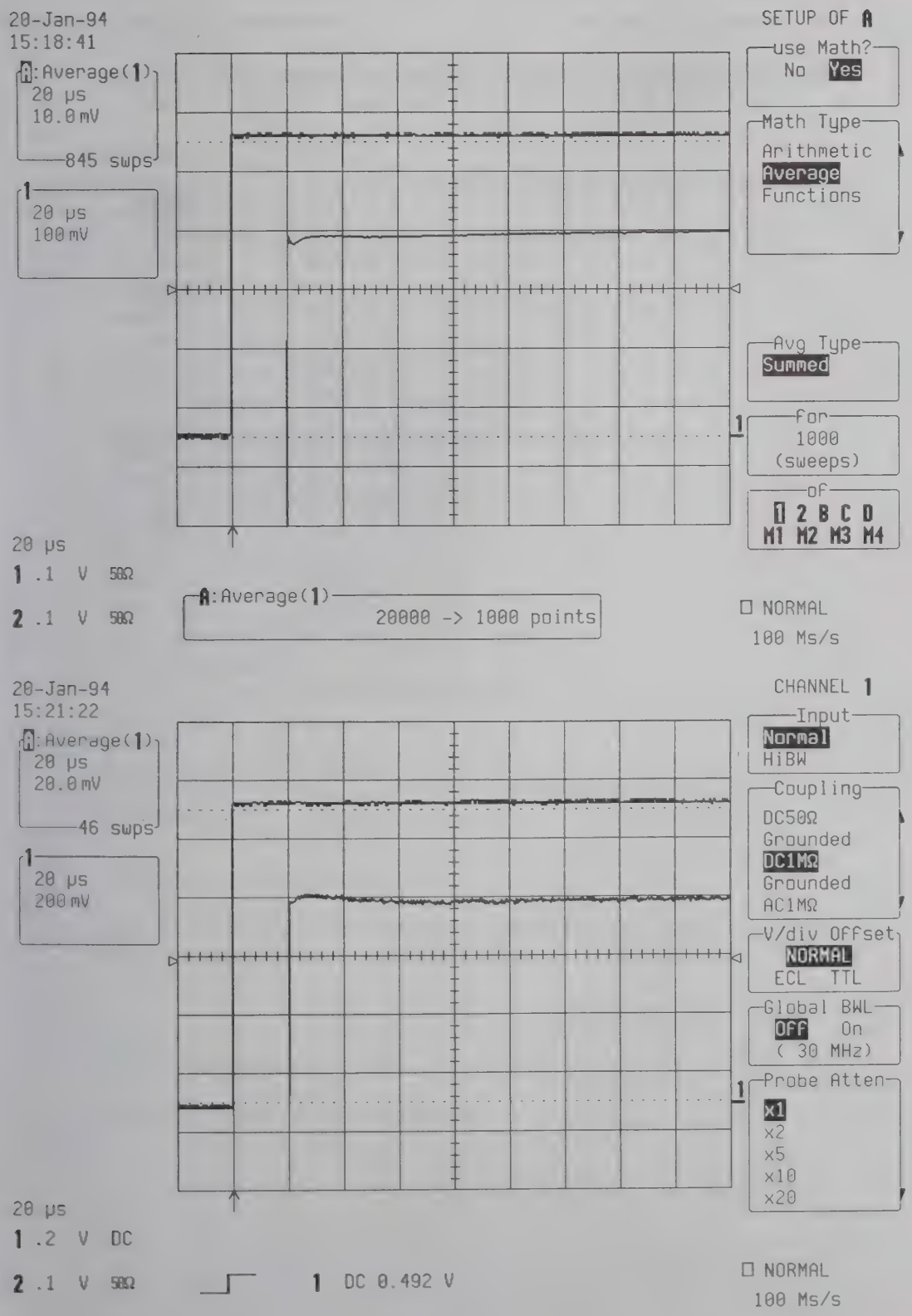
- Turn on trace : Ch1
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Input Channel 1 : Normal
- Coupling Channel 1 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1
- Input offset : - 250 mV
- Input gain : 100 mV/div
- Trigger setup : Edge
- Trigger on : 1
- Trigger level : DC 250 mV
- Coupling 1 : DC
- Slope 1 : Pos
- Mode : Normal
- Holdoff : Off
- Timebase : 20 µsec/div
- Delay : 10 % Pre-Trigger
- Turn on trace : A
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine A
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 1

- With the vertical Zoom set A to 10 mV

Adjust pot R1041 to get a flat square wave, with the top of the overshoot at the same level as the settled value.

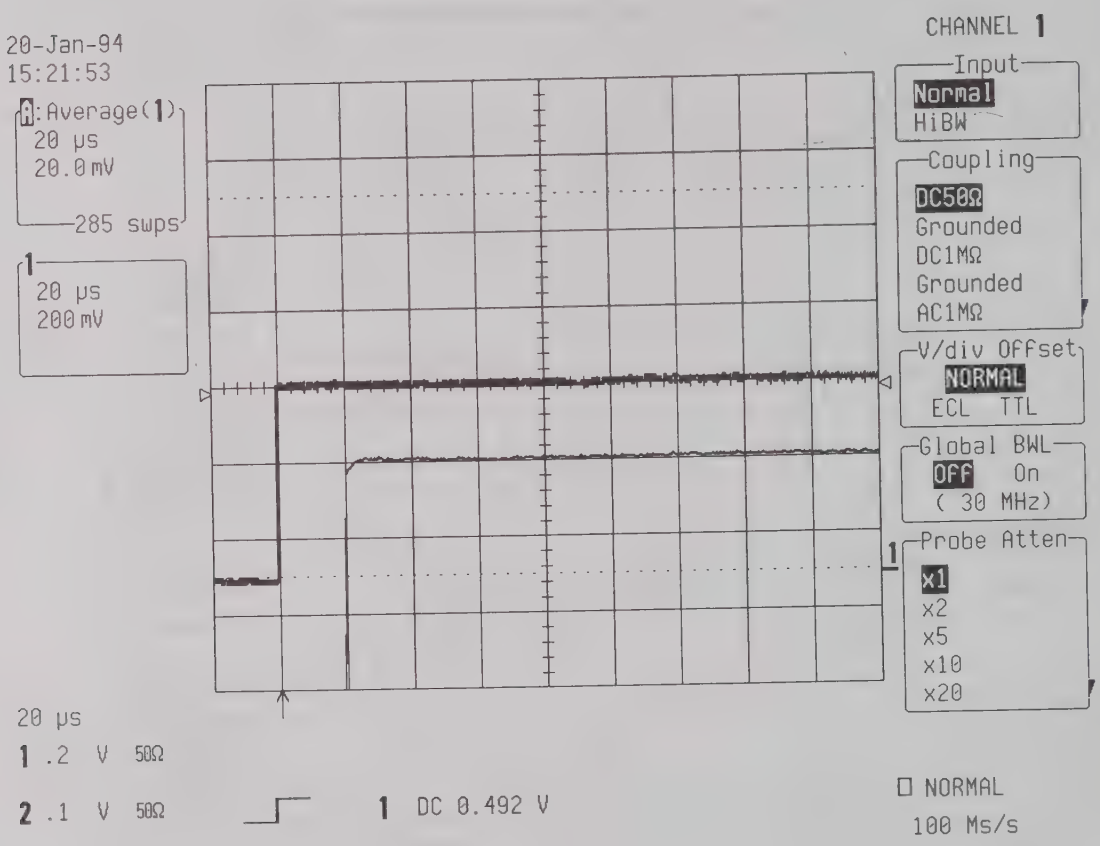
- Set Input gain : 200 mV/div
- Coupling Channel 1 : DC 1 MΩ

Adjust cap C1009 to get a flat square wave.


20-Jan-94
15:18:41
A:Average(1)
20 µs
10.0 mV
845 swps
1
20 µs
100 mV
SETUP OF A
use Math?
No Yes
Math Type
Arithmetic
Average
Functions
Avg Type
Summed
For
1000
(sweeps)
of
1 2 B C D
M1 M2 M3 M4
20 µs
1 .1 V 50Ω
2 .1 V 50Ω
A:Average(1)
20000 -> 1000 points
NORMAL
100 Ms/s
20-Jan-94
15:21:22
A:Average(1)
20 µs
20.0 mV
46 swps
1
20 µs
200 mV
CHANNEL 1
Input
Normal
HiBW
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
20 µs
1 .2 V DC
2 .1 V 50Ω
1 DC 0.492 V
NORMAL
100 Ms/s

- Set Coupling Ch 1 : DC 50Ω

- Check the flatness, typically a slight positive or negative slope.



7.6.3.7.2 Channel 2 HF Adjustment

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 2, 300 MHz normal input. Set pulser to 62.5 msec low frequency.

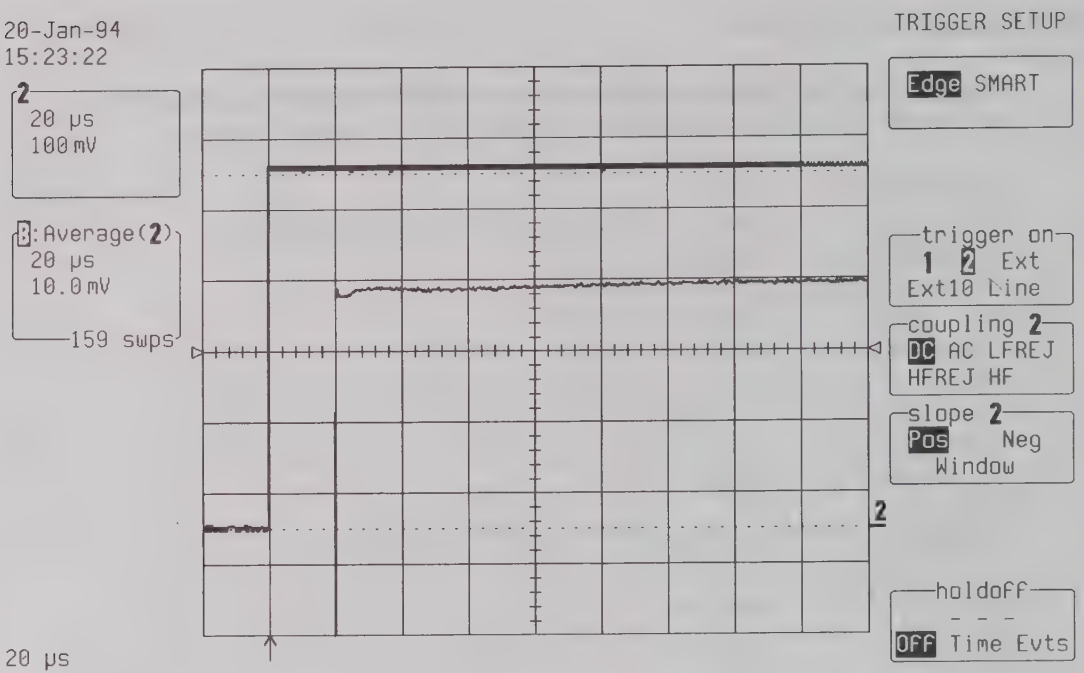
- Turn on trace : Ch2
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Input Channel 2 : Normal
- Coupling Channel 2 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1
- Input offset : - 250 mV
- Input gain : 100 mV/div
- Trigger setup : Edge
- Trigger on : 2
- Trigger level : DC 250 mV
- Coupling 2 : DC
- Slope 2 : Pos
- Mode : Normal
- Holdoff : Off
- Timebase : 20 µsec/div
- Delay : 10 % Pre-Trigger
- Turn on trace : B
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine B
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 2

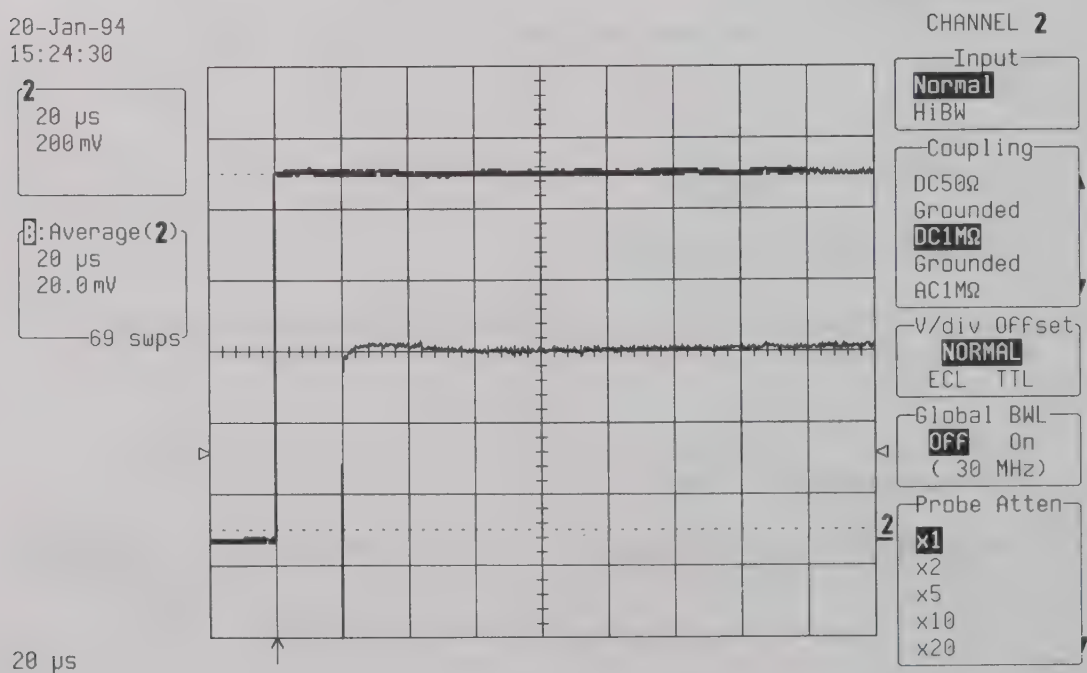
- With the vertical Zoom set B to 10 mV

Adjust pot R2041 to get a flat square wave, with the top of the overshoot at the same level as the settled value.

- Set Input gain : 200 mV/div
- Coupling Channel 2 : DC 1 MΩ

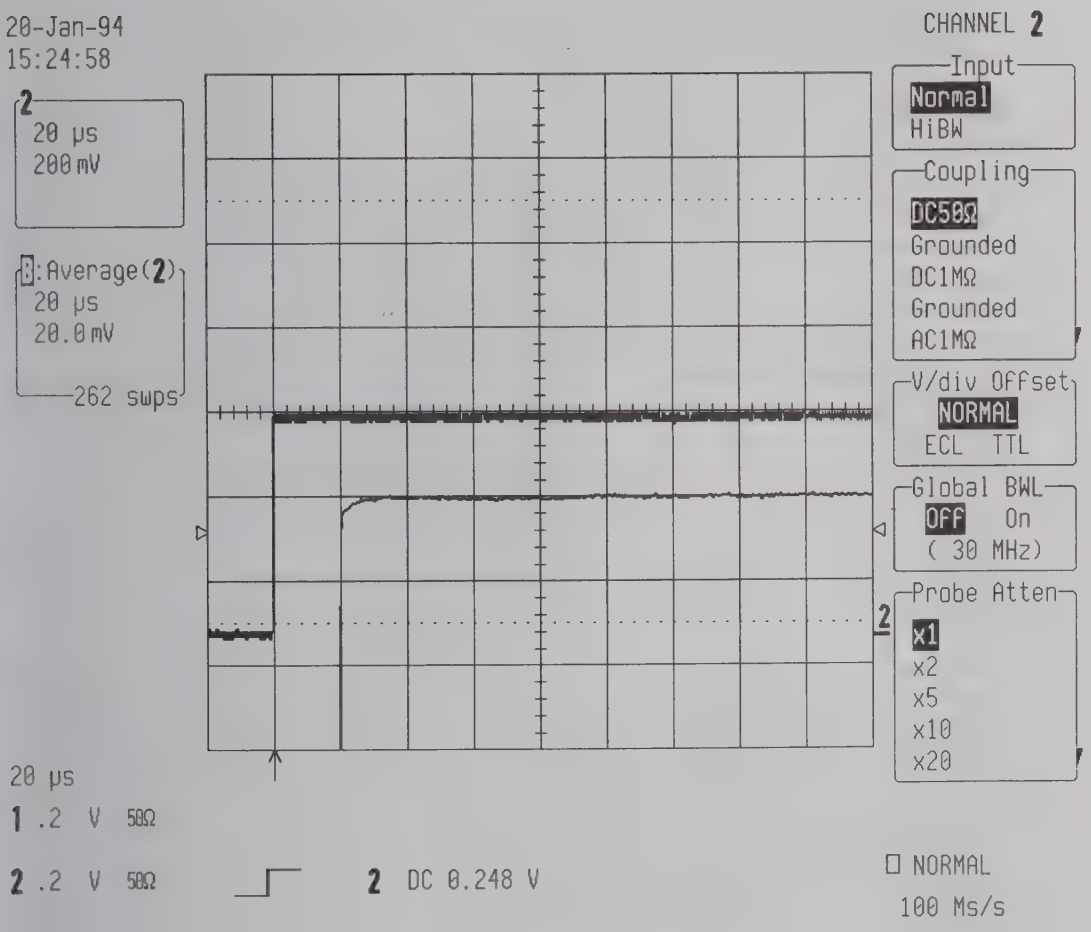
Adjust cap C2009 to get a flat square wave.


20-Jan-94
15:23:22
2
20 µs
100 mV
3:Average(2)
20 µs
10.0 mV
159 swps
TRIGGER SETUP
Edge SMART
trigger on
1 2 Ext
Ext10 Line
coupling 2
DC AC LFREJ
HFREJ HF
slope 2
Pos Neg
Window
holdoff
- - -
Off Time Evts
20 µs
1 .2 V 50Ω
2 .1 V 50Ω
2 DC 250 mV
NORMAL
100 Ms/s


20-Jan-94
15:24:30
2
20 µs
200 mV
3:Average(2)
20 µs
20.0 mV
69 swps
CHANNEL 2
Input
Normal
HiBW
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
20 µs
1 .2 V 50Ω
2 .2 V DC
2 DC 0.248 V
NORMAL
100 Ms/s

- Set Coupling Ch 2 : DC 50Ω

- Check the flatness, typically a slight positive or negative slope.



7.6.3.8 600 MHz High Bandwidth input Overshoot Adjustment for 9360 only

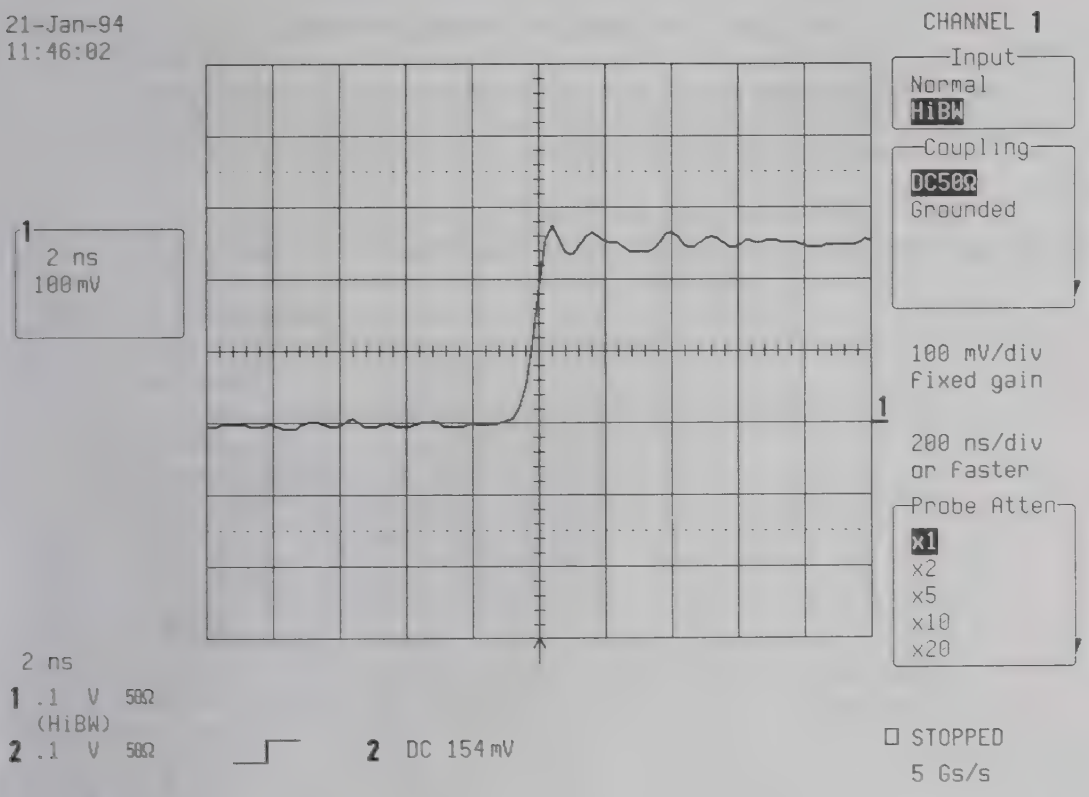
7.6.3.8.1 Channel 1 Overshoot Adjustment for F9360-3 PCB Rev G only

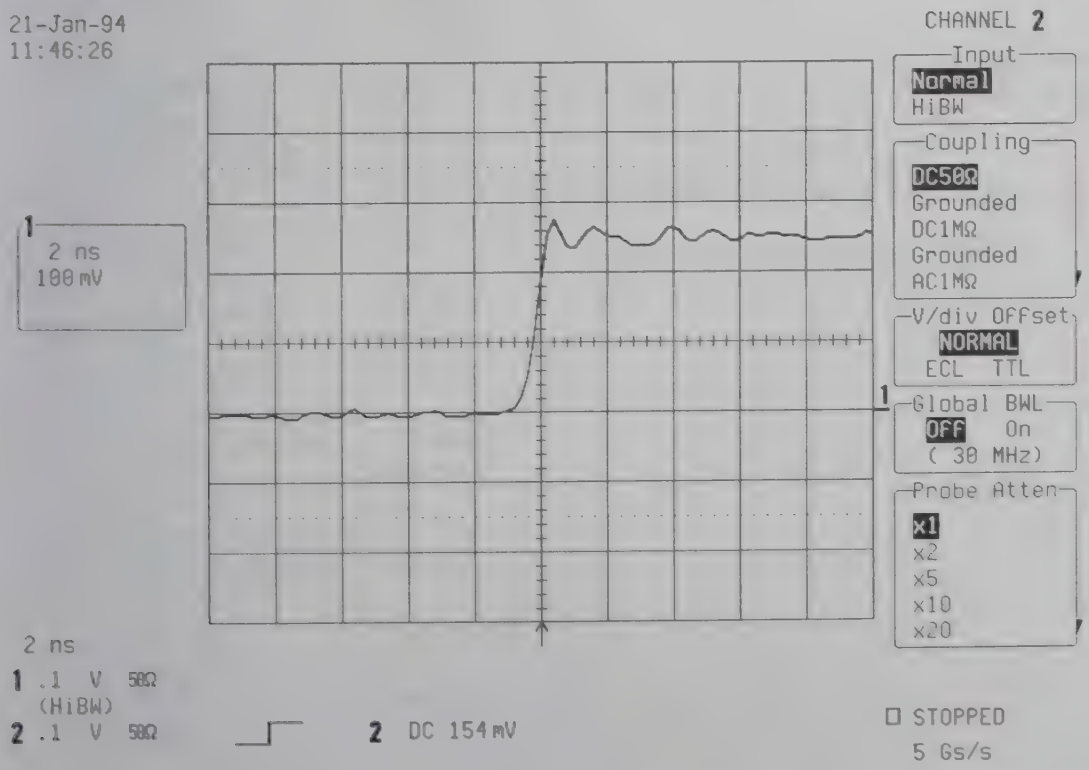
- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 1 (600 MHz) high bandwidth input and Channel 2 (300 MHz) normal input through a 50 Ω splitter and two short 50 Ω BNC cables (1 nsec).

- Turn on trace : Ch1
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Input Channel 1 : HIBW
- Coupling Channel 1 : DC 50 Ω
- Probe atten : X1
- Input offset : - 100 mV
- Input gain is fixed : 100 mV/div
- Input Channel 2 : Normal
- Coupling Channel 2 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1

- Trigger setup : Edge
- Trigger on : 2
- Trigger level : DC 150 mV
- Coupling 2 : DC
- Slope 2 : Pos
- Mode : Normal
- Holdoff : Off
- Timebase : 2 nsec/div
- Delay : 50 % Pre-Trigger
- Turn on trace : A
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine A
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 1
- Turn off trace : Channel 1

- Cursors/Measure : Parameters
- Mode : Custom
- Statistics : on
- Change Parameters :
- on displayed trace : A
- On line 1 :
- Measure : Over + of A
- On line 2 :
- Measure : Rise of A


21-Jan-94
11:46:02
CHANNEL 1
Input
Normal
HiBW
Coupling
DC50Ω
Grounded
1
2 ns
100 mV
100 mV/div
Fixed gain
200 ns/div
or Faster
Probe Atten
x1
x2
x5
x10
x20
2 ns
1 .1 V 50Ω
(HiBW)
2 .1 V 50Ω
2 DC 154 mV
STOPPED
5 Gs/s


21-Jan-94
11:46:26
CHANNEL 2
Input
Normal
HiBW
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
1
2 ns
100 mV
2 ns
1 .1 V 50Ω
(HiBW)
2 .1 V 50Ω
2 DC 154 mV
STOPPED
5 Gs/s

Adjust C3022 to get 6 % Overshoot

- Check that rise time is typically .8 nsec

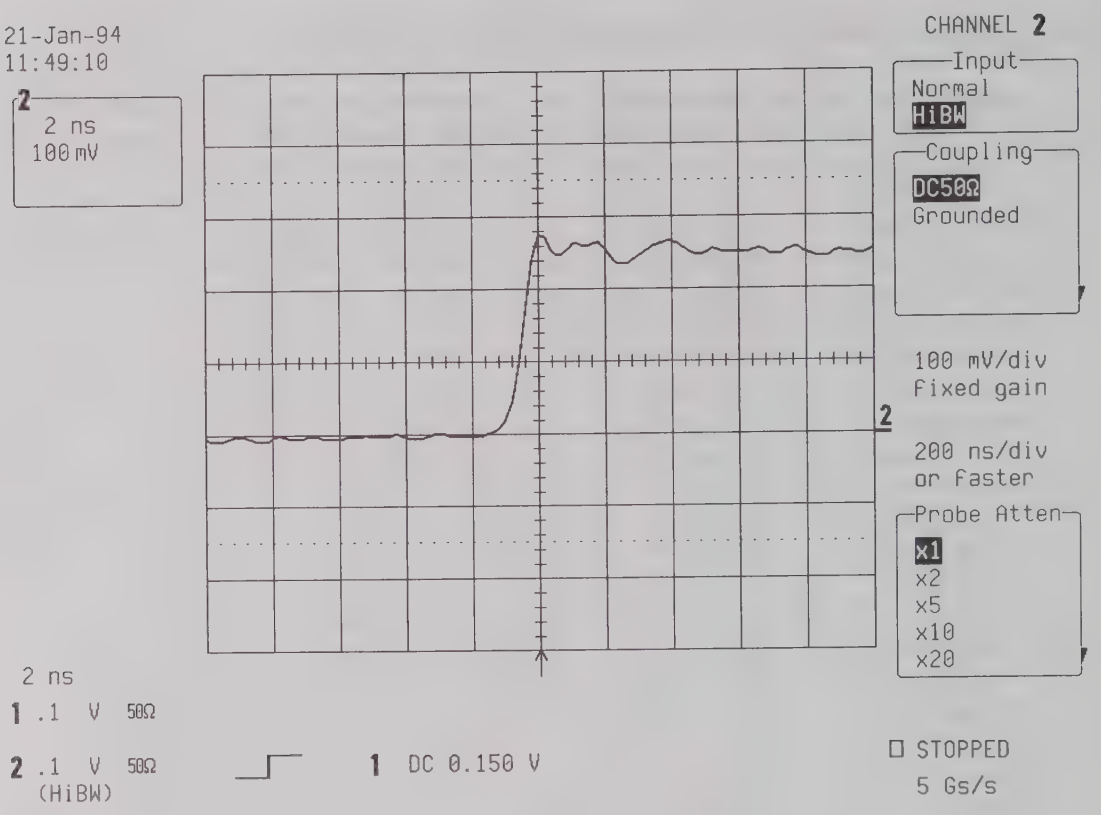
7.6.3.8.2 Channel 2 Overshoot Adjustment for F9360-3 PCB Rev G only

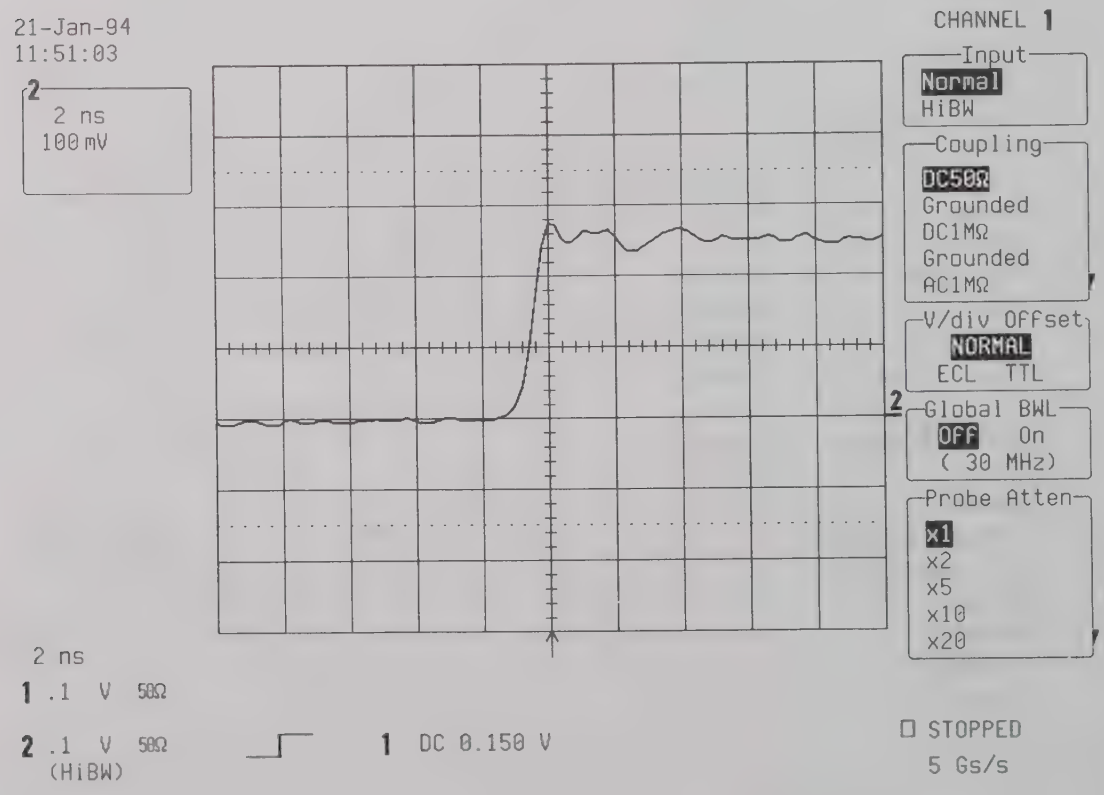
- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 2 (600 MHz) high bandwidth input and Channel 1 (300 MHz) normal input through a 50 Ω splitter and two short 50 Ω BNC cables (1 nsec).

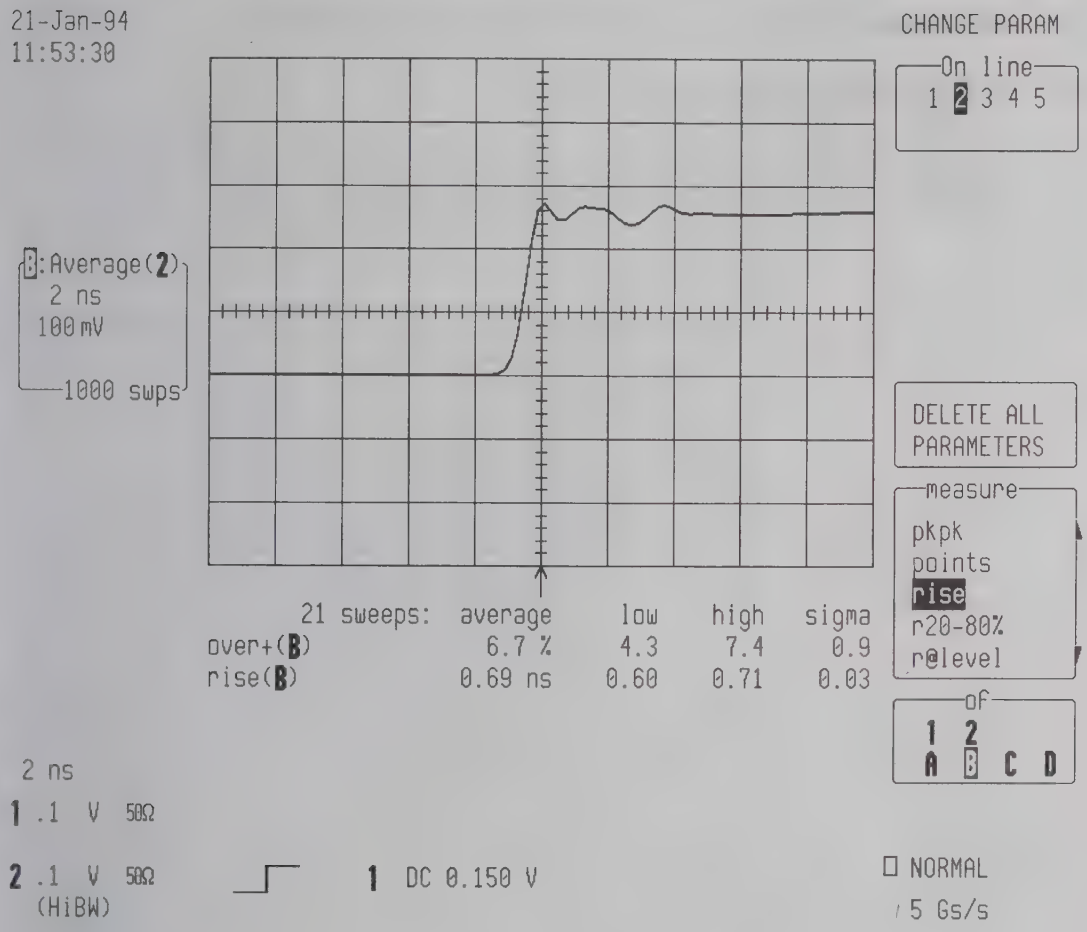
- Turn on trace : Ch2
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Input Channel 2 : HIBW
- Coupling Channel 2 : DC 50 Ω
- Probe atten : X1
- Input offset : - 100 mV
- Input gain is fixed : 100 mV/div
- Input Channel 1 : Normal
- Coupling Channel 1 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1

- Trigger setup : Edge
- Trigger on : 1
- Trigger level : DC 150 mV
- Coupling 1 : DC
- Slope 1 : Pos
- Mode : Normal
- Holdoff : Off
- Timebase : 2 nsec/div
- Delay : 50 % Pre-Trigger
- Turn on trace : B
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine B
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 2
- Turn off trace : Channel 2

- Cursors/Measure : Parameters
- Mode : Custom
- Statistics : on
- Change Parameters :
- on displayed trace : B
- On line 1 :
- Measure : Over + of B
- On line 2 :
- Measure : Rise of B


21-Jan-94
11:49:10
2
2 ns
100 mV
CHANNEL 2
Input
Normal
HiBW
Coupling
DC50Ω
Grounded
100 mV/div
Fixed gain
200 ns/div
or faster
Probe Atten
x1
x2
x5
x10
x20
2 ns
1 .1 V 50Ω
2 .1 V 50Ω
(HiBW)
1 DC 0.150 V
STOPPED
5 Gs/s


21-Jan-94
11:51:03
2
2 ns
100 mV
CHANNEL 1
Input
Normal
HiBW
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off On
(30 MHz)
Probe Atten
x1
x2
x5
x10
x20
2 ns
1 .1 V 50Ω
2 .1 V 50Ω
(HiBW)
1 DC 0.150 V
STOPPED
5 Gs/s



Adjust C4022 to get 6 % Overshoot

- Check that rise time is typically .8 nsec

7.6.3.9 600 MHz High Bandwidth input Flatness Adjustment for 9360 only

7.6.3.9.1 Channel 1 Flatness Adjustment for 9360 only

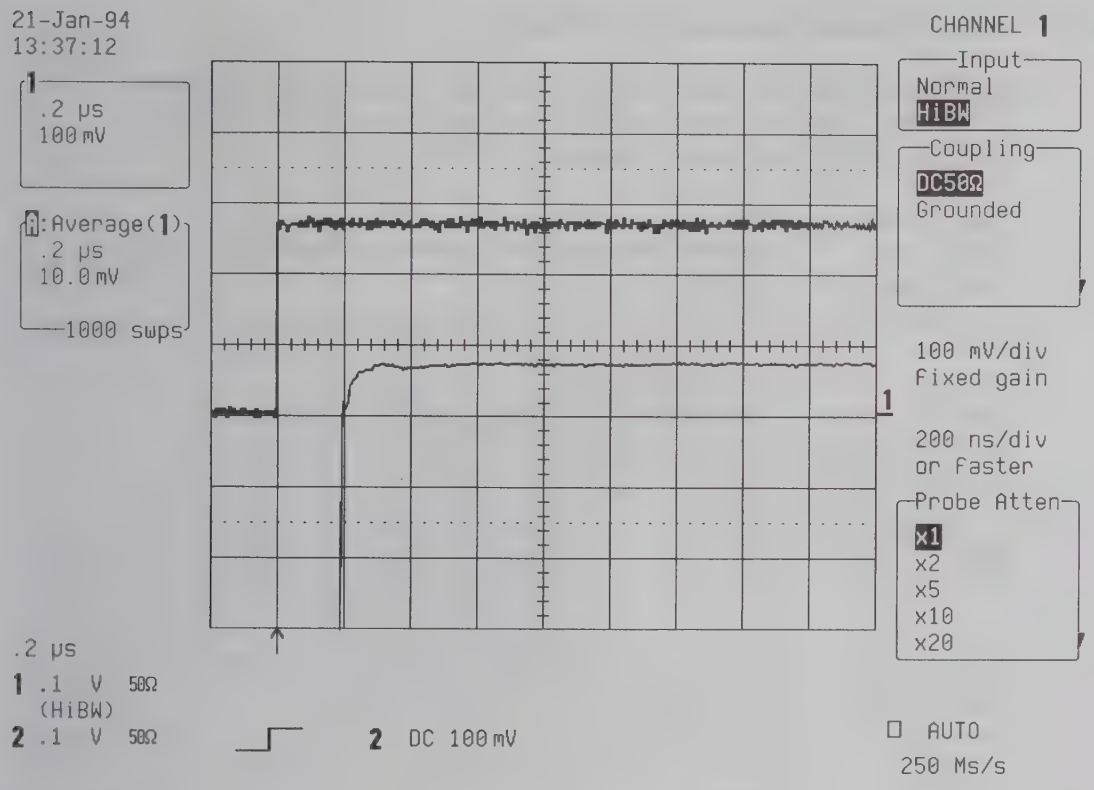
- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 1 (600 MHz) high bandwidth input and Channel 2 (300 MHz) normal input through a 50 Ω splitter and two short 50 Ω BNC cables (1 nsec).

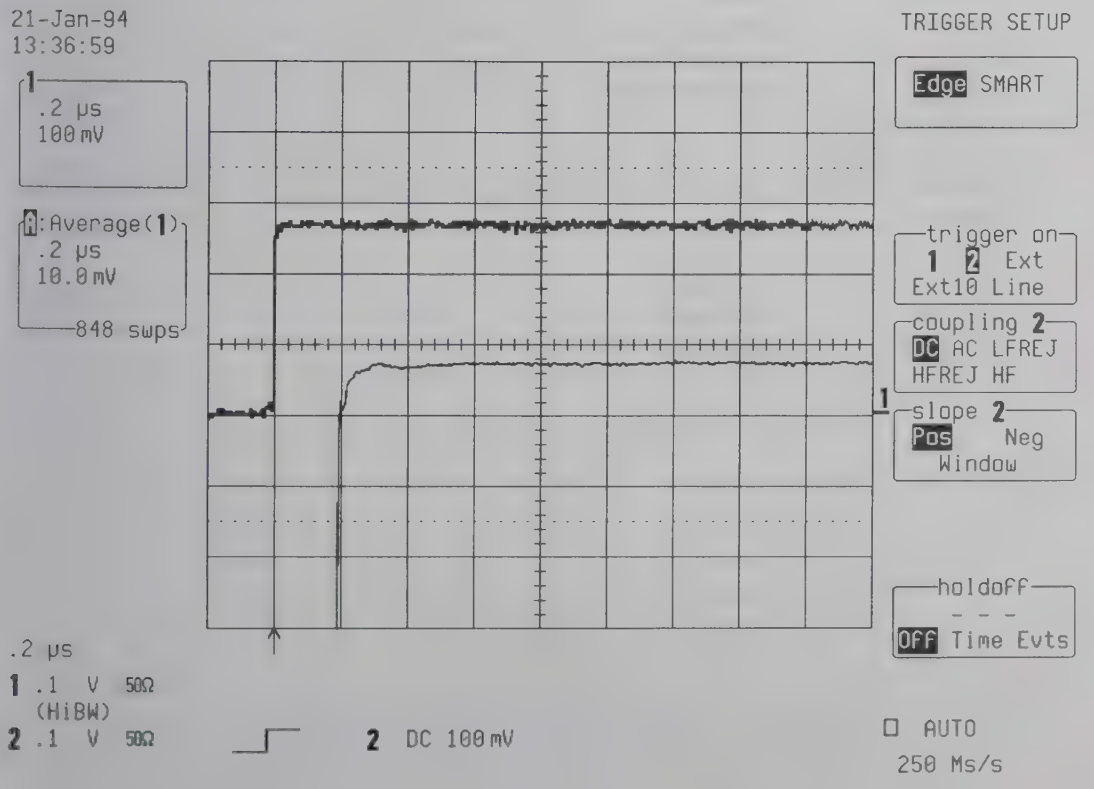
- Turn on trace : Ch1
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Input Channel 1 : HIBW
- Coupling Channel 1 : DC 50 Ω
- Probe atten : X1
- Input offset : - 100 mV
- Input gain is fixed : 100 mV/div
- Input Channel 2 : Normal
- Coupling Channel 2 : DC 50 Ω
- V/div. offset : Normal
- Global BWL : Off
- Probe atten : X1

- Trigger setup : Edge
- Trigger on : 2
- Trigger level : DC 150 mV
- Coupling 2 : DC
- Slope 2 : Pos
- Mode : Normal
- Holdoff : Off
- Timebase : 0.2 µsec/div
- Delay : 10 % Pre-Trigger
- Turn on trace : A
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine A
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 1

- With the vertical Zoom set A to 10 mV

Adjust pot R3045 to get a flat square wave.


21-Jan-94
13:37:12
1
.2 µs
100 mV
Average(1)
.2 µs
10.0 mV
1000 swps
CHANNEL 1
Input
Normal
HiBW
Coupling
DC50Ω
Grounded
100 mV/div
Fixed gain
200 ns/div
or faster
Probe Atten
x1
x2
x5
x10
x20
.2 µs
1 .1 V 50Ω
(HiBW)
2 .1 V 50Ω
2 DC 100 mV
AUTO
250 Ms/s

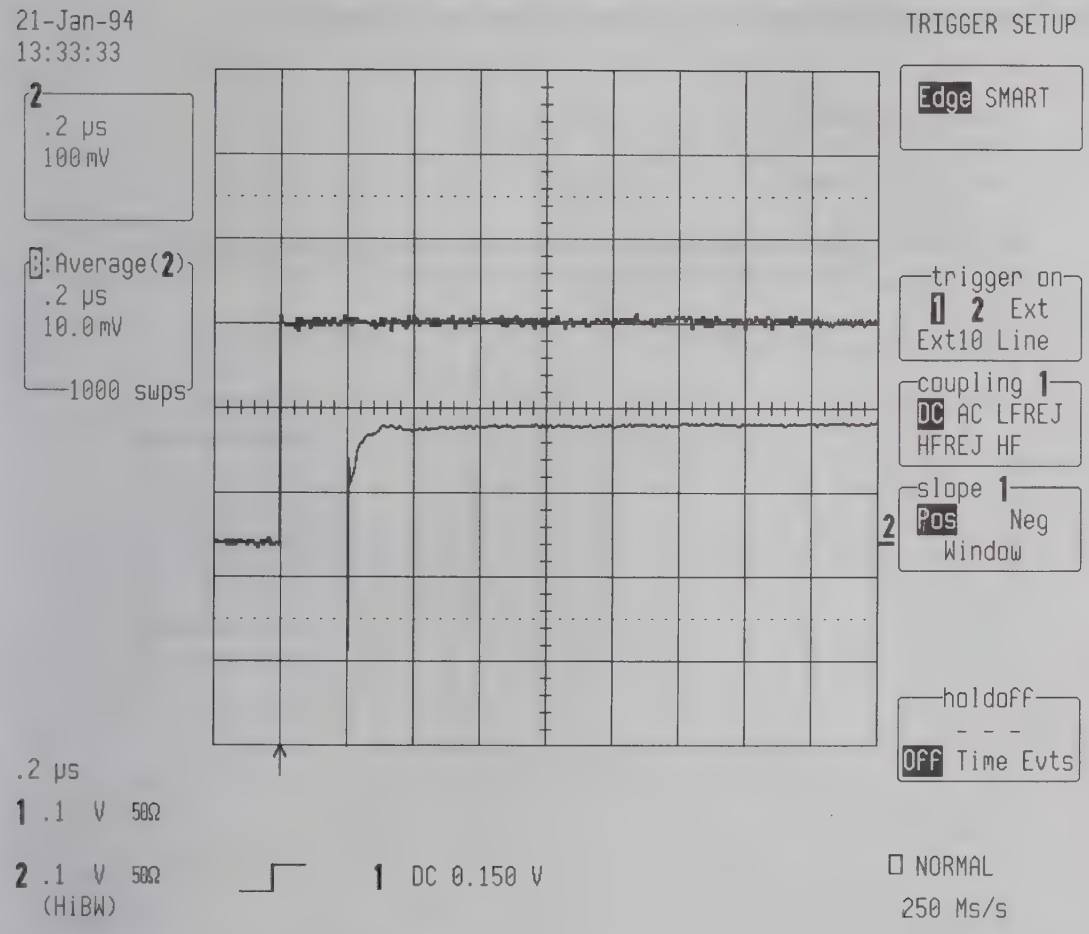

21-Jan-94
13:36:59
1
.2 µs
100 mV
Average(1)
.2 µs
10.0 mV
848 swps
TRIGGER SETUP
Edge SMART
trigger on
1 2 Ext
Ext10 Line
coupling 2
DC AC LFREJ
HFREJ HF
slope 2
Pos Neg
Window
holdoff
Off Time Evts
.2 µs
1 .1 V 50Ω
(HiBW)
2 .1 V 50Ω
2 DC 100 mV
AUTO
250 Ms/s

7.6.3.9.2 Channel 2 Flatness Adjustment for 9360 only

- Apply the fast rise time pulse generator LeCroy 4969 or equivalent (< 600 psec) to Channel 2 (600 MHz) high bandwidth input and Channel 1 (300 MHz) normal input through a 50 Ω splitter and two short 50 Ω BNC cables (1 nsec).

- Turn on trace : Ch2
- Display setup : Standard, Persistence off, Dot join on, Single grid
- Input Channel 2 : HIBW
- Coupling Channel 1 : DC 50 Ω
- Probe atten : X1
- Input offset : - 100 mV
- Input gain is fixed : 100 mV/div
- Input Channel 2 : Normal
- Coupling Channel 2 : DC 50 Ω
- V/div, offset : Normal
- Global BWL : Off
- Probe atten : X1

- Trigger setup : Edge
- Trigger on : 1
- Trigger level : DC 150 mV
- Coupling 1 : DC
- Slope 1 : Pos
- Mode : Normal
- Holdoff : Off
- Timebase : 0.2 µsec/div
- Delay : 10 % Pre-Trigger
- Turn on trace : B
- Select Math Setup
- For Math : Use at most 1000 points
- Redefine B
- Use Math ? : Yes
- Math Type : Average
- Avg Type : Summed
- Of : Channel 2



- With the vertical Zoom set B to 10 mV

Adjust pot R4045 to get a flat square wave.

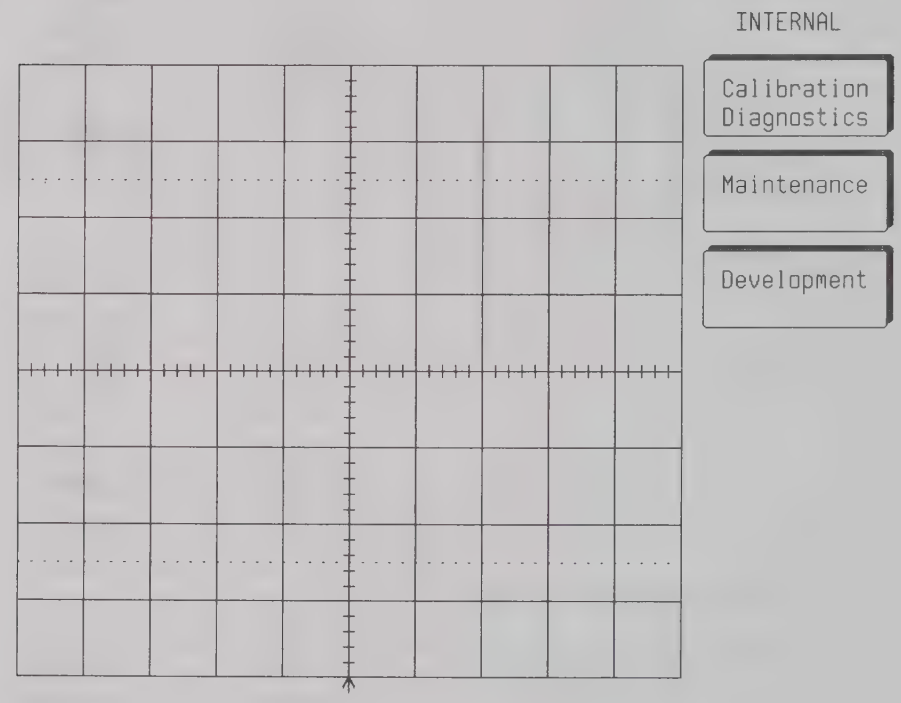
7.6.3.10 600 MHz High Bandwidth Input Offset Adjustment for 9360 only

- Select Input Channel 1 : HIBW

- Select Input Channel 2 : HIBW

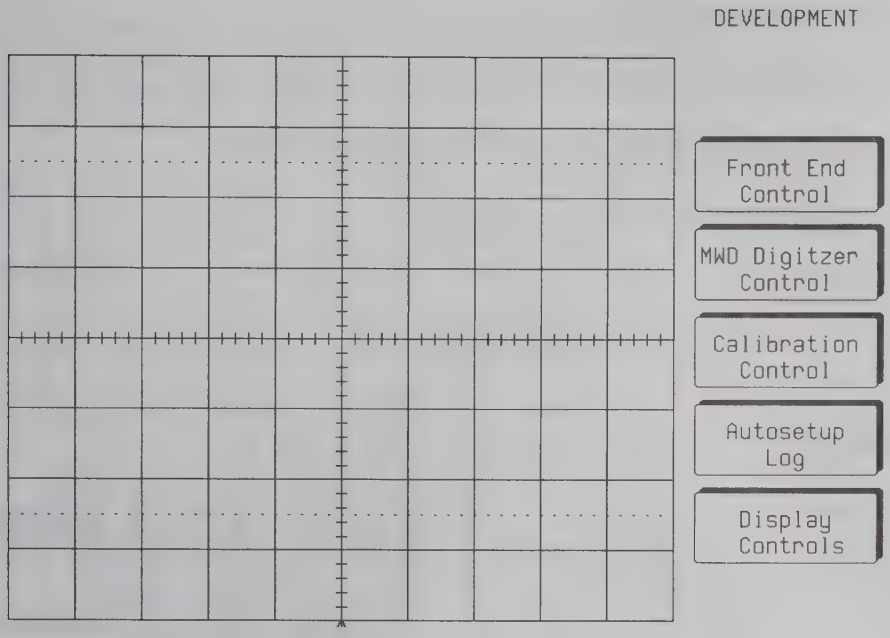
Enter in the internal calibration diagnostics by simultaneously depressing the third and fourth push buttons, and then by depressing the fifth.

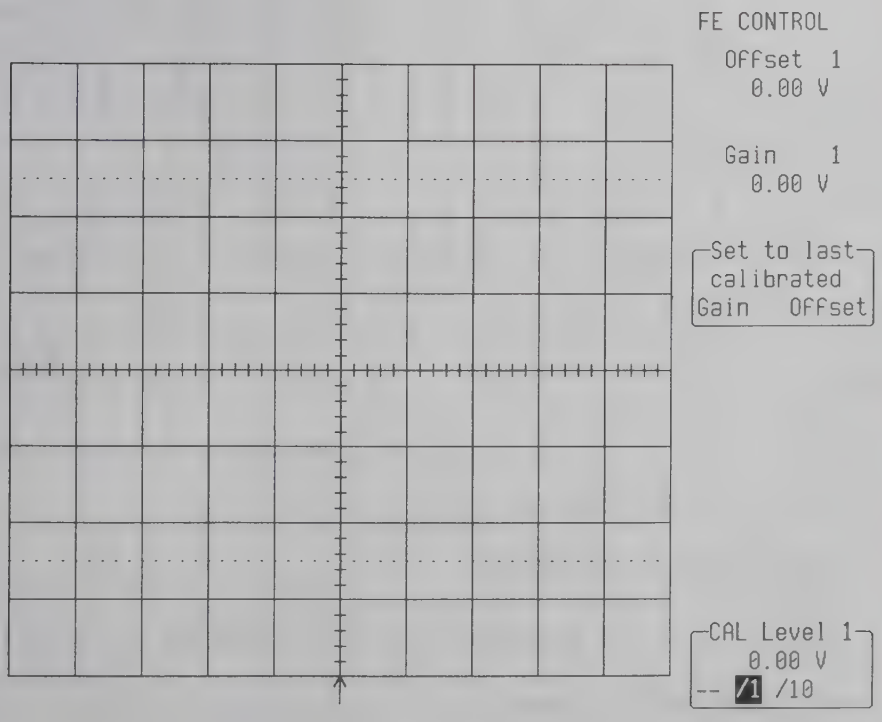
- Select Development menu



- Select Front End Control menu

- Set Cal Level : /1 and 0,00 V





- For Channel 1 adjust potentiometer R 3024 in order to get 0.00 mV on pin 7 (+) of TP4000.

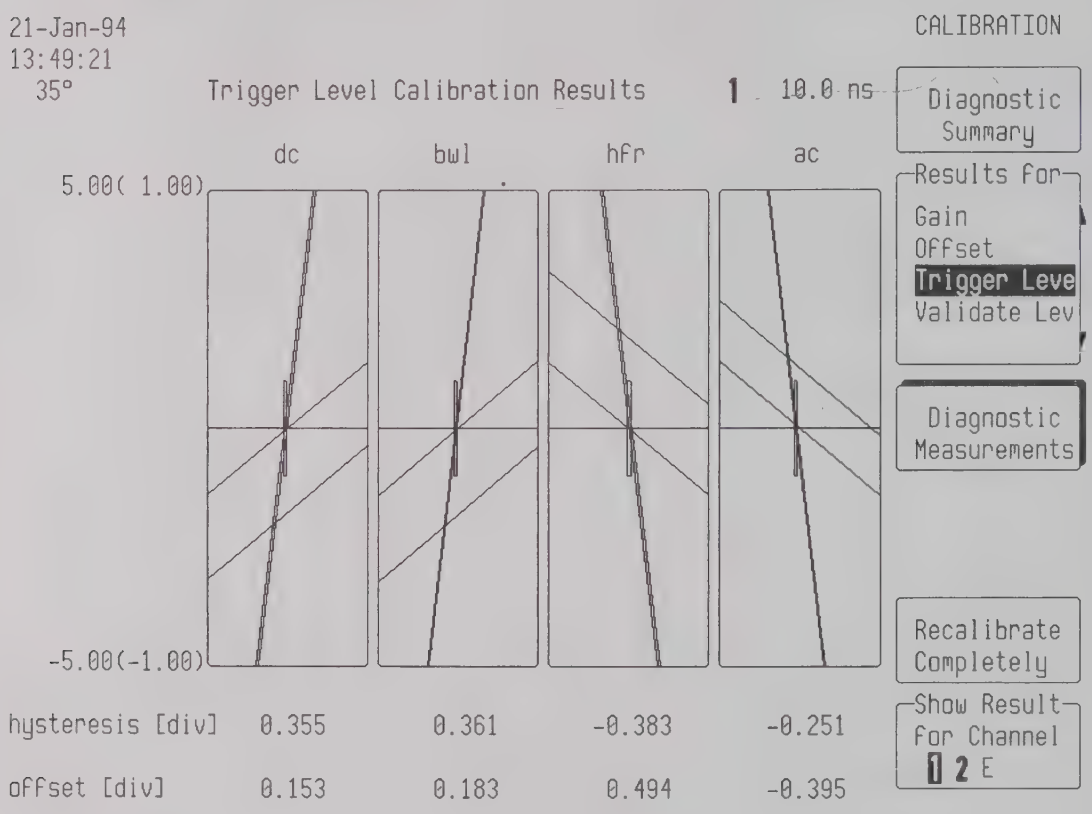
- For Channel 2 adjust potentiometer R 4024 in order to get 0.00 mV on pin 8 (+) of TP4000.

7.6.3.11 Triger Hysteresis Control

- In the Calibration Diagnostics select Diagnostics Results.

- Select Results for Trigger level, and Show Result for Channel 1

- Push Recalibrate Completely



- Adjust potentiometer R5049 to get :

DC Hysteresis (div) = 0.35 div ± 0.05 div

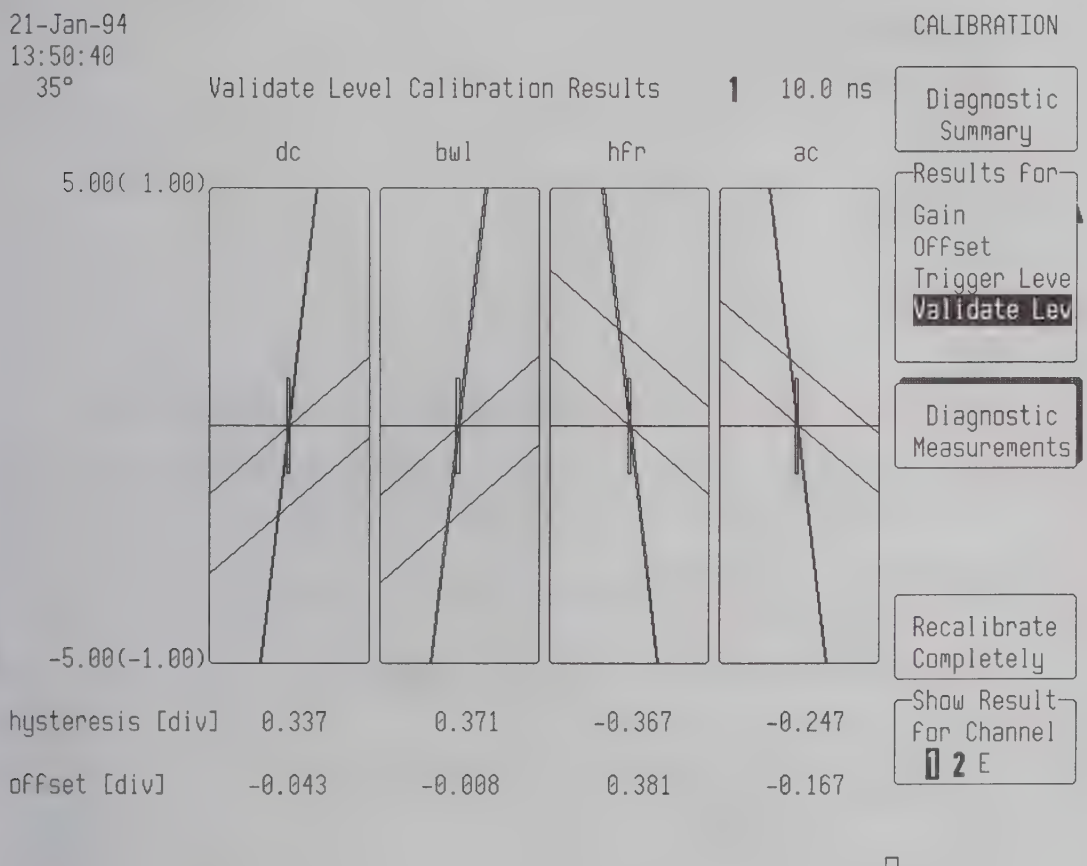
- Select Show Result for Channel 2

- Push Recalibrate Completely

Check Channel 2 DC Hysteresis (div) = 0.35 div ± 0.05 div

- Select Results for Validate level, and Show Result for Channel 1

- Push Recalibrate Completely



- Adjust potentiometer R5048 to get :

DC Hysteresis (div) = 0.35 div ± 0.05 div

- Select Show Result for Channel 2

- Push Recalibrate Completely

Check Channel 2 DC Hysteresis (div) = 0.35 div ± 0.05 div

7.6.3.12 DC 50 Ω Overload Adjustment

7.6.3.12.1 Channel 1 DC 50 Ω Overload Adjustment

- Turn on trace : Channel 1
- Input : Normal
- Input Coupling : DC 50 Ω
- Input gain : 1 V/div.
- Input offset : - 3.5 V
- Trigger on : 1
- Trigger level : DC 0.1 V
- Delay : zero
- Coupling 1 : DC
- Slope 1 : Pos
- Mode : Auto
- Timebase : 2 sec/div.
- From the power supply (Tektronix PS5004) apply DC 7.07 V (1 Watt) to Channel 1.

- Adjust the potentiometer R1010, such that the overload trips within 10 to 15 seconds. (turn clockwise if it's too slow or counterclockwise if it's too fast)

- Set Timebase : 5 sec/div.
- From the power supply (Tektronix PS5004) apply 5 V (.5 Watt) to Channel 1

- Check that the overload doesn't trip for at least 30 seconds.

7.6.3.12.2 Channel 2 DC 50 Ω Overload Adjustment

- Turn on trace : Channel 2
- Input : Normal
- Input Coupling : DC 50 Ω
- Input gain : 1 V/div.
- Input offset : - 3.5 V
- Trigger on : 2
- Trigger level : DC 0.1 V
- Delay : zero
- Coupling 2 : DC
- Slope 2 : Pos
- Mode : Auto
- Timebase : 2 sec/div.
- From the power supply (Tektronix PS5004) apply DC 7.07 V (1 Watt) to Channel 2.

- Adjust the potentiometer R2010, such that the overload trips within 10 to 15 seconds. (turn clockwise if it's too slow or counterclockwise if it's too fast)

- Set Timebase : 5 sec/div.
- From the power supply (Tektronix PS5004) apply 5 V (.5 Watt) to Channel 2

- Check that the overload doesn't trip for at least 30 seconds.

SECTION 8 SCHEMATICS, LAYOUTS, PARTS LIST

9360 & 9361

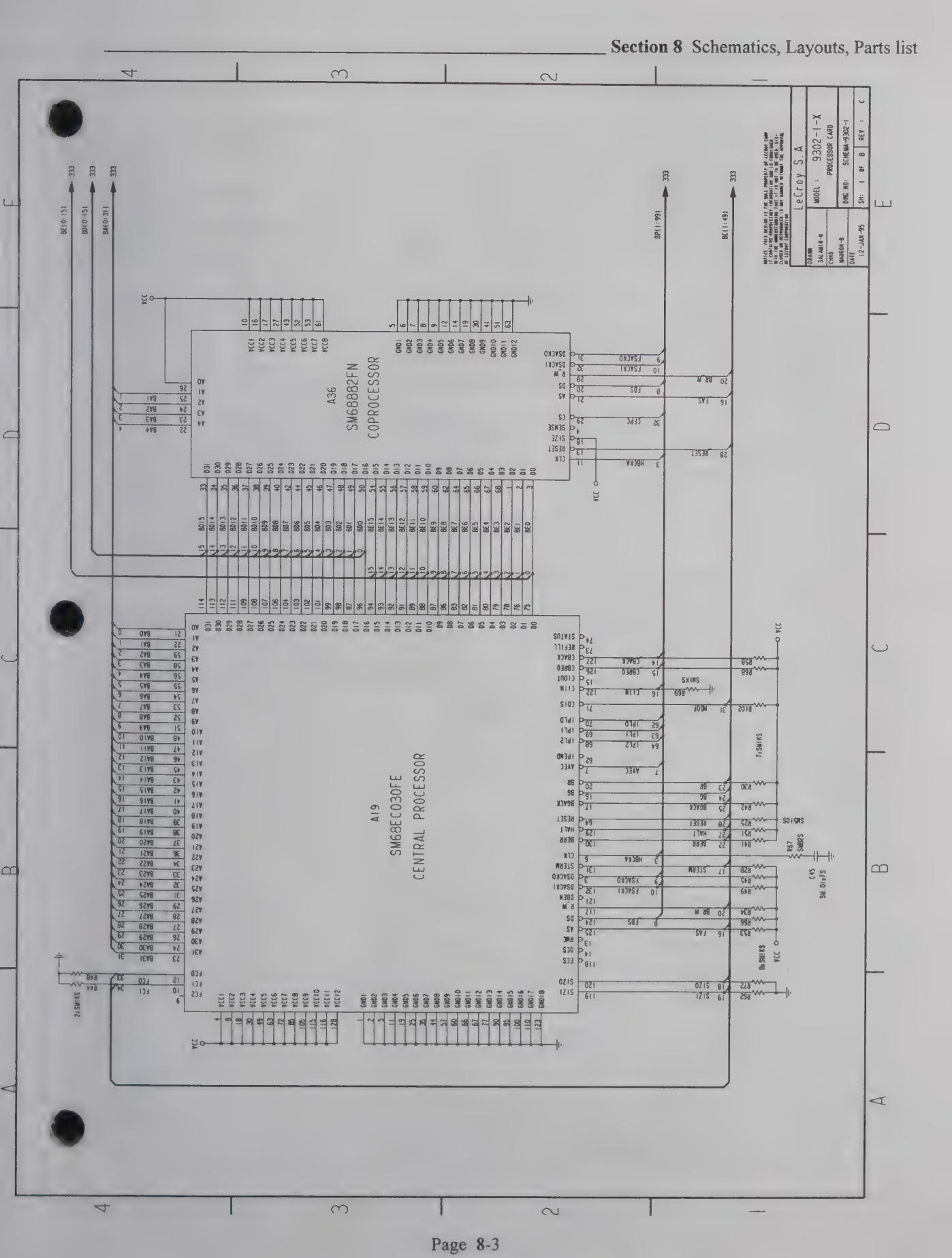
Digital Storage Oscilloscope

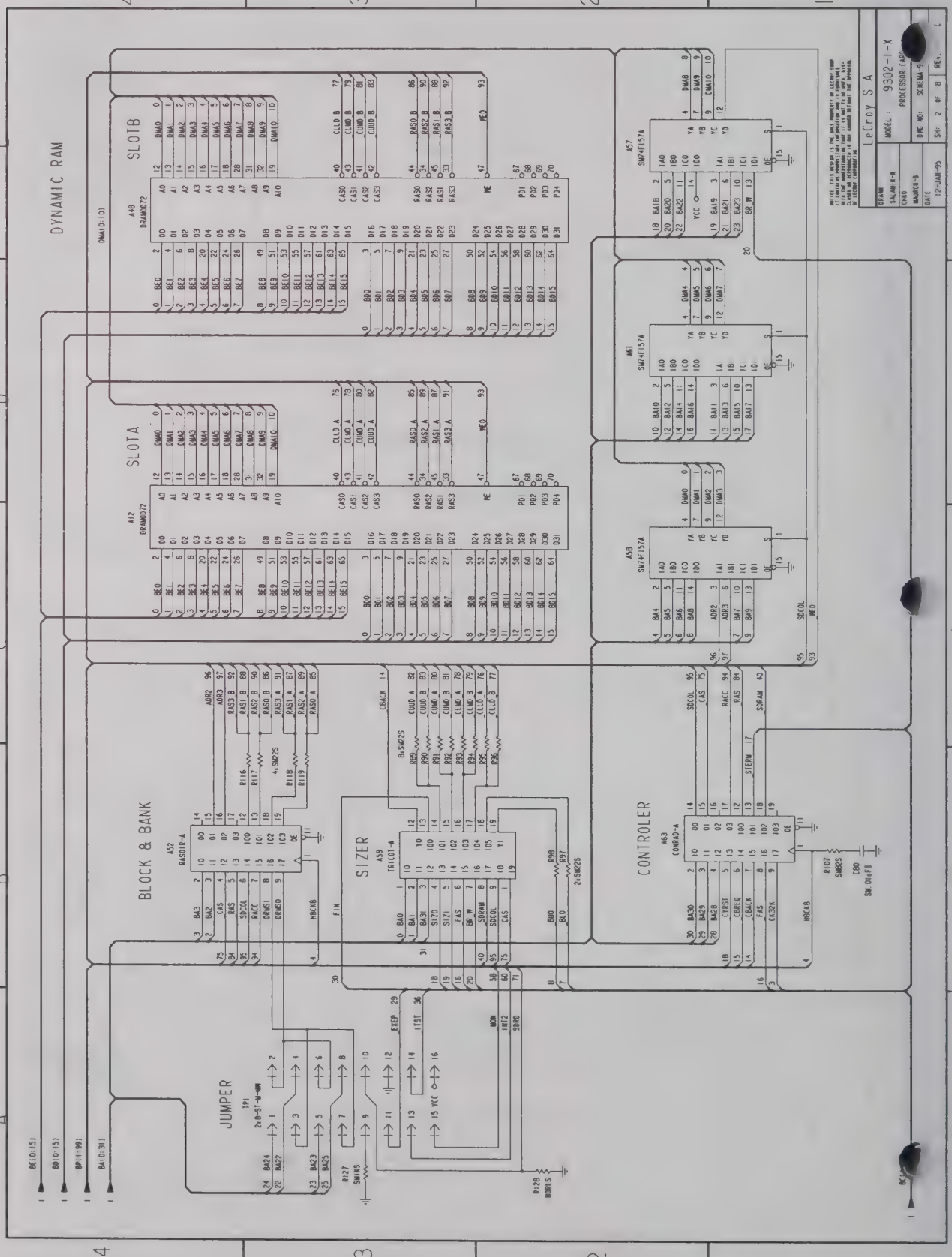
PART: 9360 DESC: 600 MHz, DUAL CHANNEL 5 Gs/s DSO, 5 K

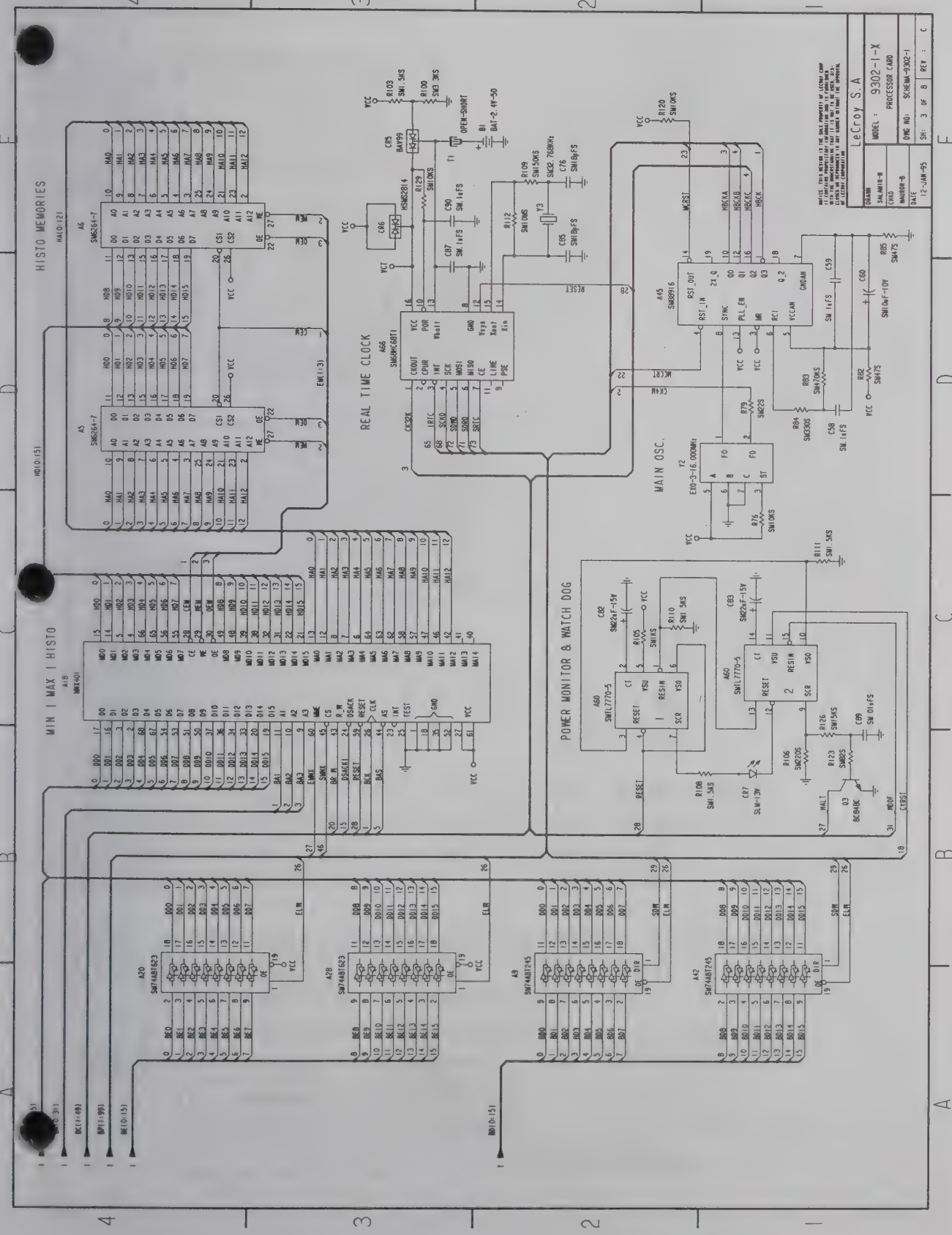
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205750000	IC AND-OR GATE ARRAY 16V8	1
554500001	TAPPING SCREW W/U-THREAD	2
709360016	FRONT LABEL 9360	1
709360913	SERIAL NUMBER PLATE 9360	1
F9302-1-4	PROCESSOR CARD WITH 4Mb DRAM	1
F9360-3	MAIN CARD (FRONT END, ADC, TDC)	1
F9300-4	GPIB + RS232 INTERFACE CARD	1
F9350-5	DUAL CHANNEL FRONT PANEL	1
M936X	MECHANICAL FOR 9360	1
ACCESSORIES-9360	ACCESSORIES FOR 9360	1

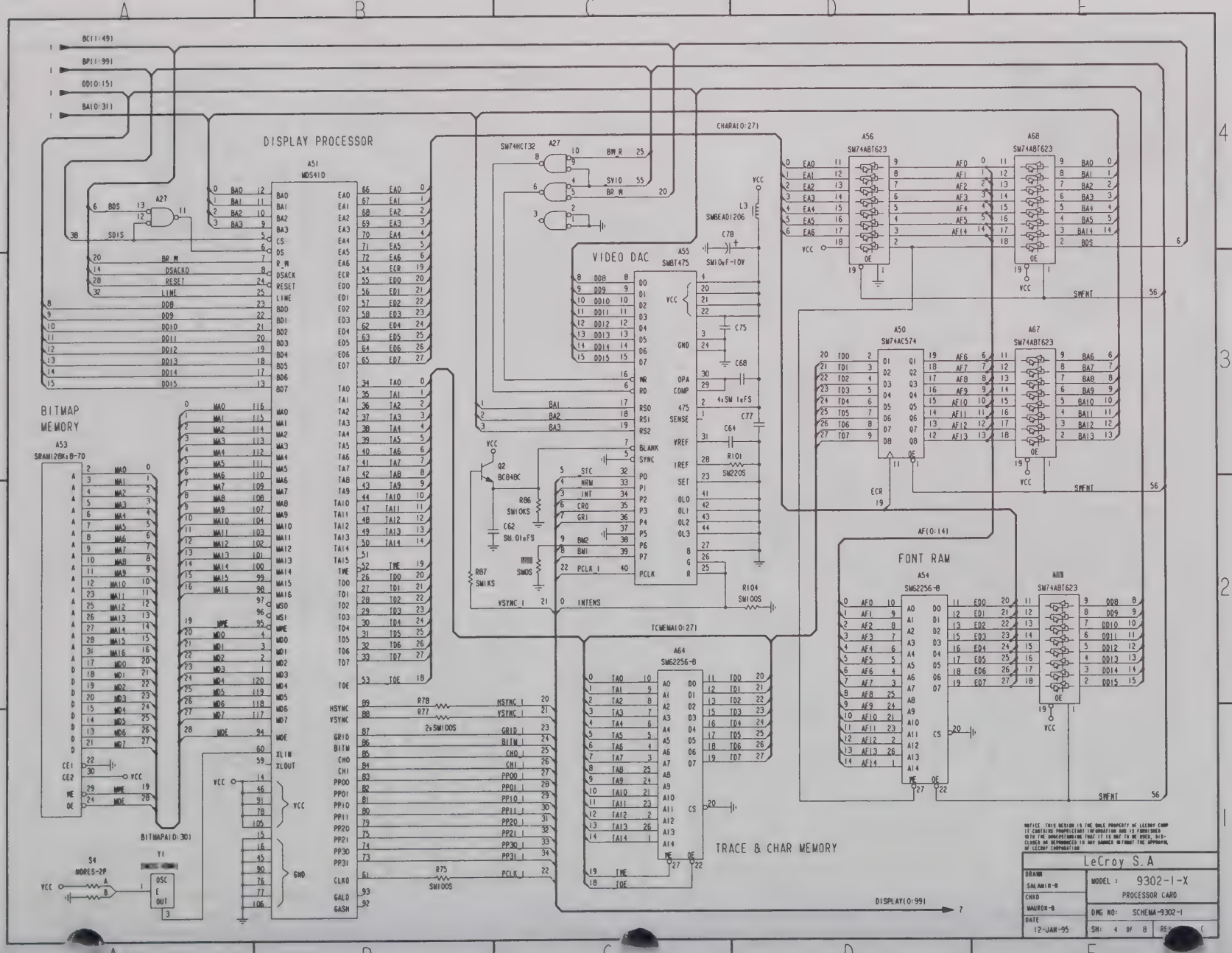
PART: 9361 DESC: 300 MHz, DUAL CHANNEL 2.5 Gs/s DSO, 5 K

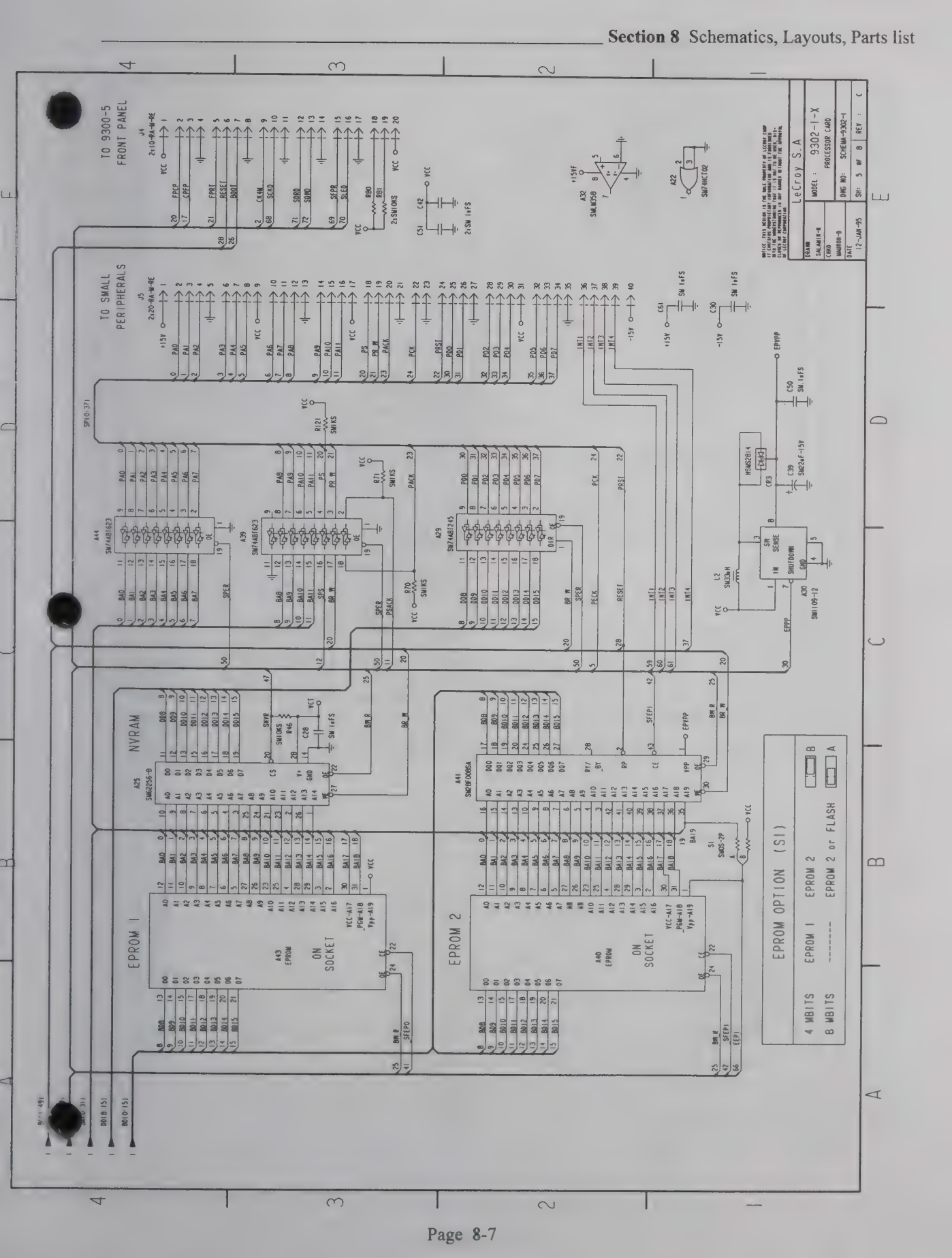
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205750000	IC AND-OR GATE ARRAY 16V8	1
554500001	TAPPING SCREW W/U-THREAD	2
709361016	FRONT LABEL 9361	1
709361A16	FRONT LABEL 9361A	1
709361913	SERIAL NUMBER PLATE 9361	1
F9300-1-2	PROCESSOR CARD WITH 2Mb DRAM	1
F9361-3	MAIN CARD (FRONT END, ADC, TDC)	1
F9300-4	GPIB + RS232 INTERFACE CARD	1
F9350-5	DUAL CHANNEL FRONT PANEL	1
M936X	MECHANICAL FOR 9361	1
ACCESSORIES-9360	ACCESSORIES FOR 9361	1

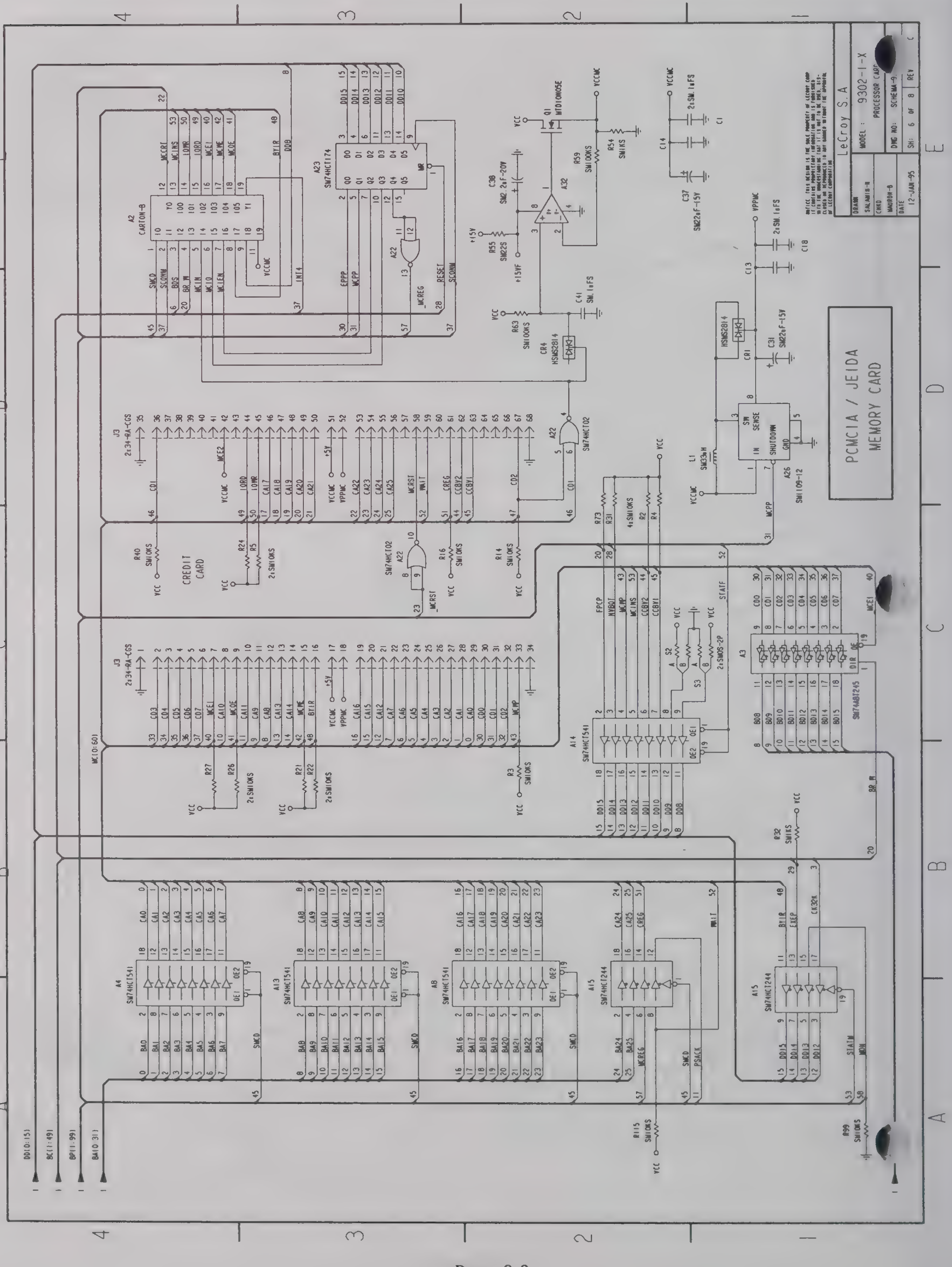

LeCroy S.A
MODEL : 9302-I-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-I
SH: 1 OF 8 REV : C
DRAWN
SALAMIN-M
CHKD
MAURER-B
DATE
12-JAN-95
A36
SM68882FN
COPROCESSOR
A19
SM68EC030FE
CENTRAL PROCESSOR

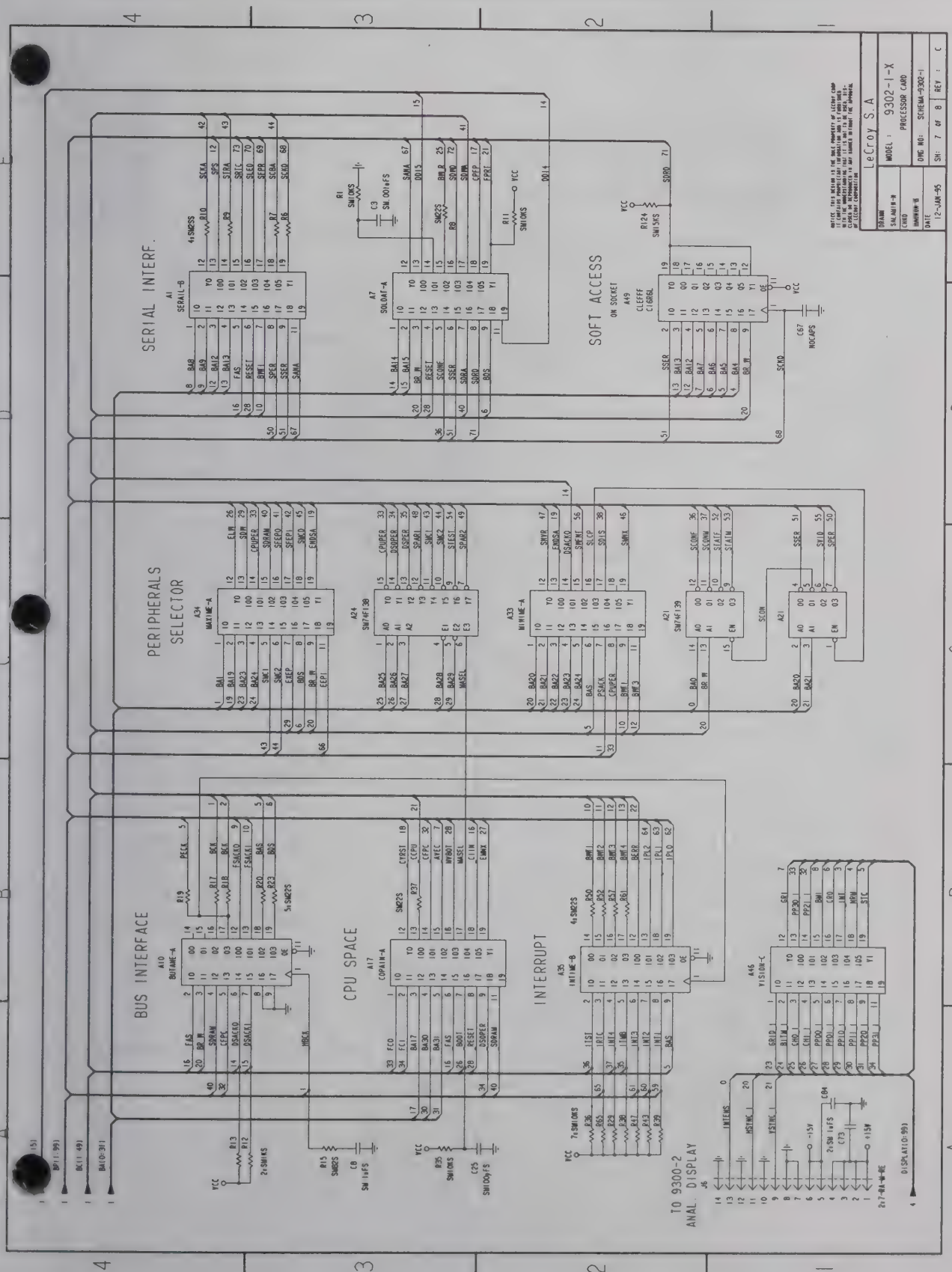

DYNAMIC RAM
SLOTB
SLOTA
BLOCK & BANK
SIZER
CONTROLER
JUMPER
LeCroy S A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9
SH: 2 OF 8
DATE 12-JAN-95

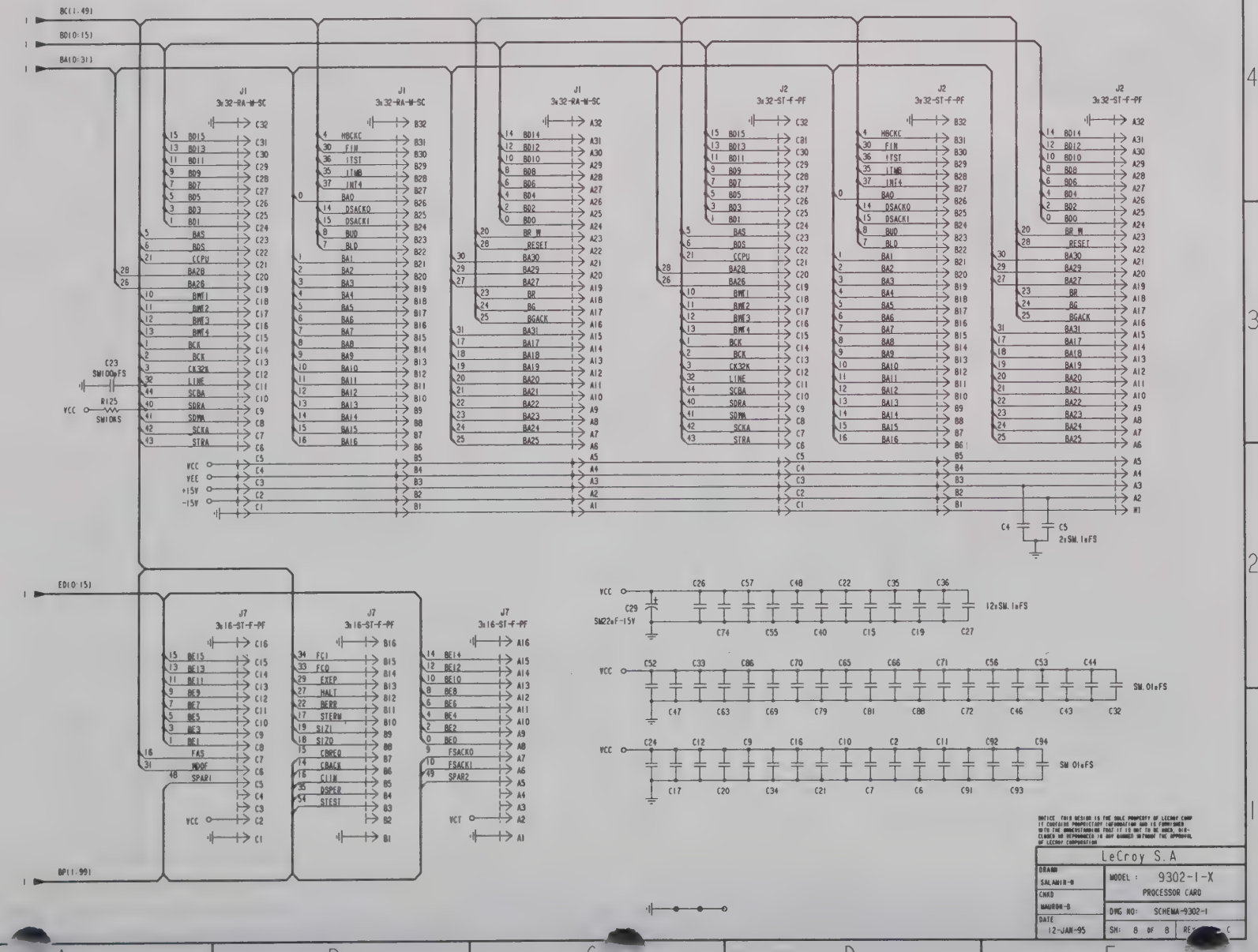

HISTO MEMORIES
REAL TIME CLOCK
MAIN OSC.
POWER MONITOR & WATCH DOG
MIN I MAX I HISTO
LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
SCHEMA-9302-1
SH: 3 OF 8
REV : C


DISPLAY PROCESSOR
BITMAP MEMORY
VIDEO DAC
FONT RAM
TRACE & CHAR MEMORY
LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
DRAWN SALAMIN-R
CHKD MAURON-B
DATE 12-JAN-95


TO 9300-5
FRONT PANEL
TO SMALL
PERIPHERALS
NVRAM
EPROM I
EPROM 2
ON
SOCKET
EPROM OPTION (SI)
4 MBITS EPROM I EPROM 2
8 MBITS ------- EPROM 2 or FLASH
LeCroy S.A.
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
DATE 12-JAN-95


PCMCIA / JEIDA
MEMORY CARD
LeCroy S.A
MODEL : 9302-1-X
SH: 6 OF 8
12-JAN-95
CREDIT CARD


SERIAL INTERF.
PERIPHERALS SELECTOR
SOFT ACCESS
BUS INTERFACE
CPU SPACE
INTERRUPT
TO 9300-2 ANAL. DISPLAY
LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
SCHEMA-9302-1
SH: 7 OF 8
REV : C
12-JAN-95


BC(1:49)
BD(0:15)
BA(0:31)
J1
3x32-RA-M-SC
J2
3x32-ST-F-PF
C23
SM100nFS
R125
SM10KS
VCC
VEE
+15V
-15V
C4
C5
2xSM.1uFS
ED(0:15)
J7
3x16-ST-F-PF
BP(1:99)
C26
C57
C48
C22
C35
C36
C29
SM22uF-15V
12xSM.1uFS
C74
C55
C40
C15
C19
C27
C52
C33
C86
C70
C65
C66
C71
C56
C53
C44
SM.01uFS
C47
C63
C69
C79
C81
C88
C72
C46
C43
C32
C24
C12
C9
C16
C10
C2
C11
C92
C94
C17
C20
C34
C21
C7
C6
C91
C93
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LeCroy S.A
DRAW
SALAMIN-M
CHKD
MAURON-B
DATE
12-JAN-95
MODEL : 9302-1-X
PROCESSOR CARD
DRG NO: SCHEMA-9302-1
SH: 8 OF 8

9302-1 Rev:B
J3
J4
J6
J5
J1
J2
B1
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
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A61
A62
A63
A64
A65
A66
A67
A68
Y1
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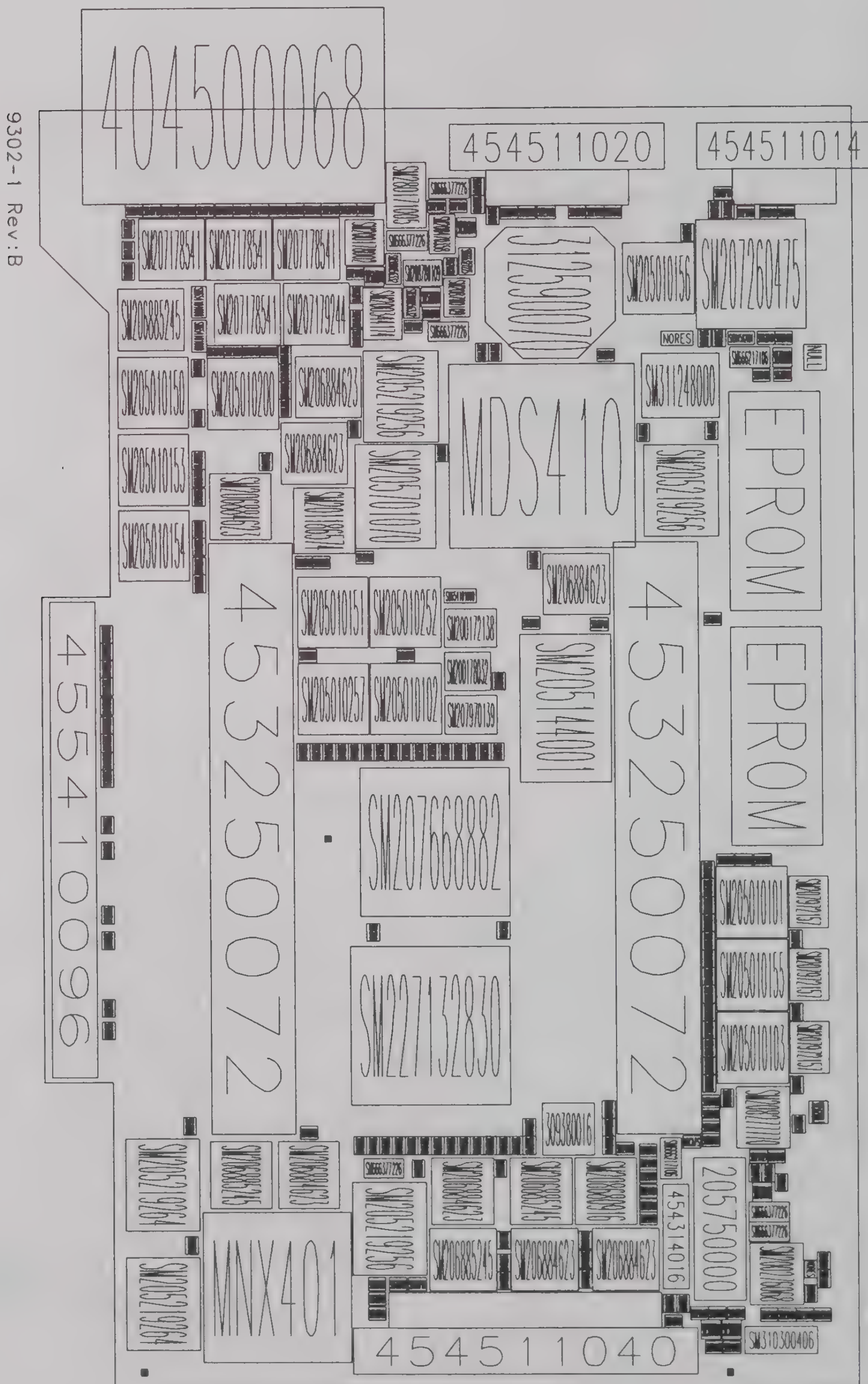
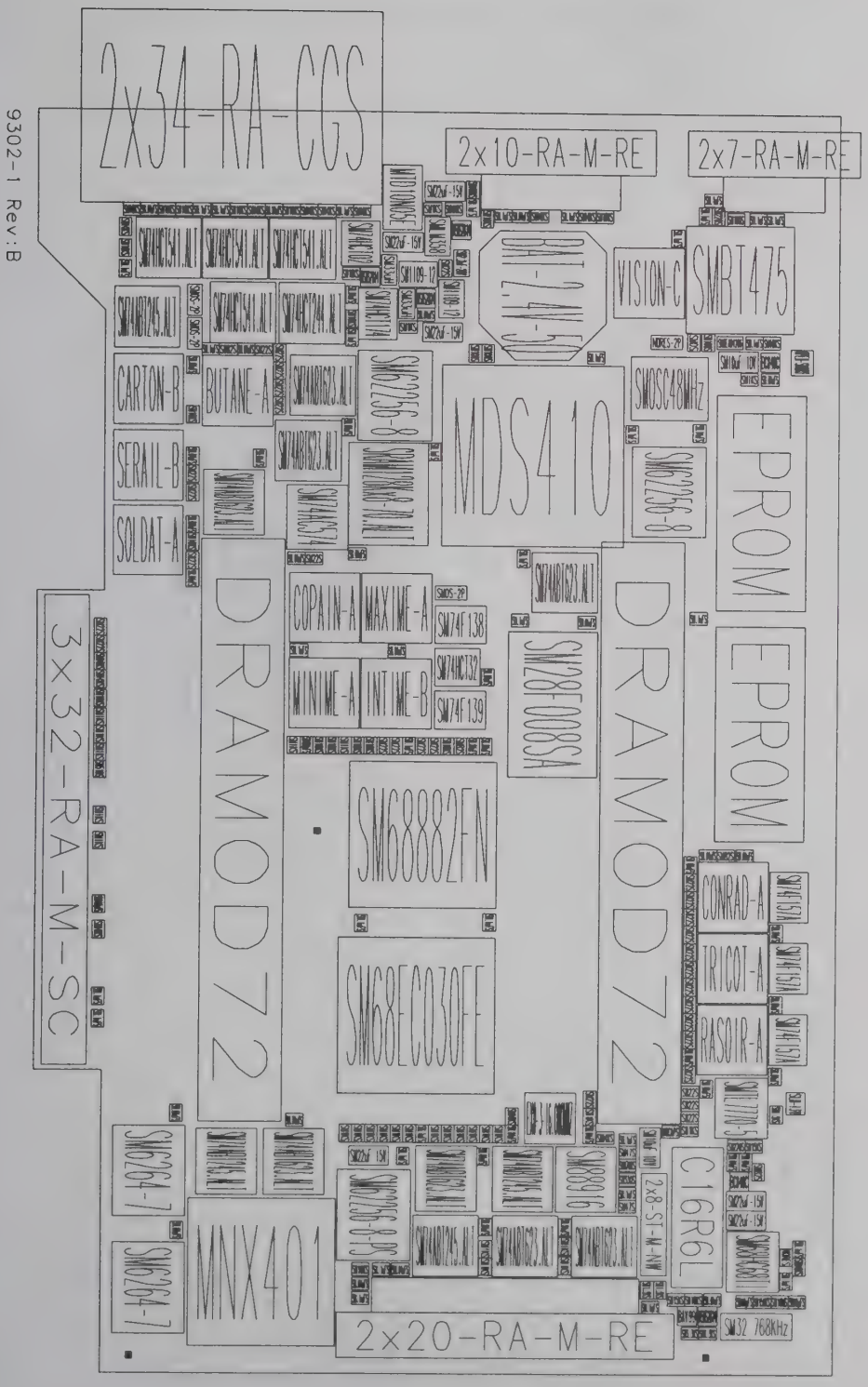
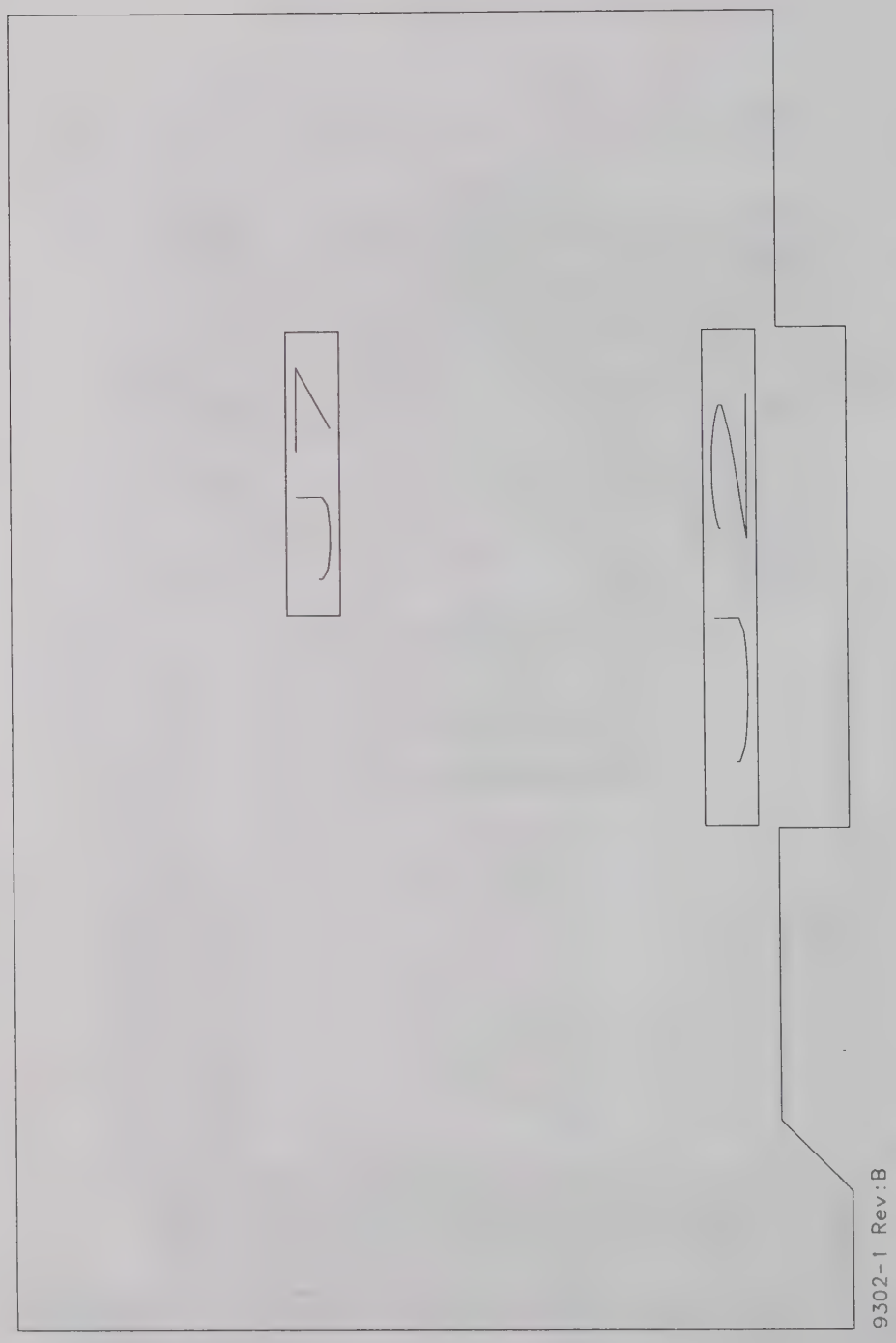
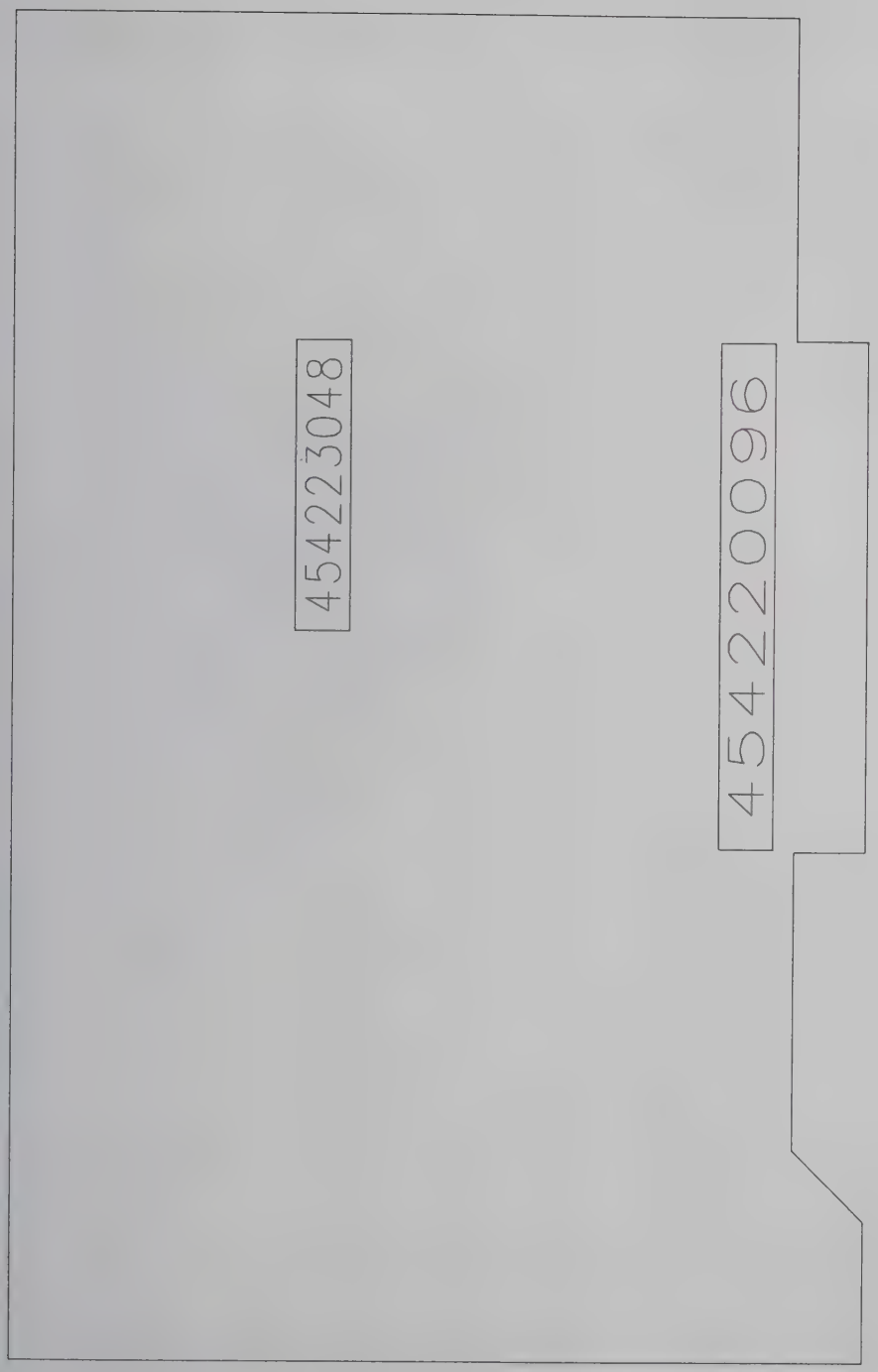
TP1
S1
S2
S3
S4
L1
L2
L3

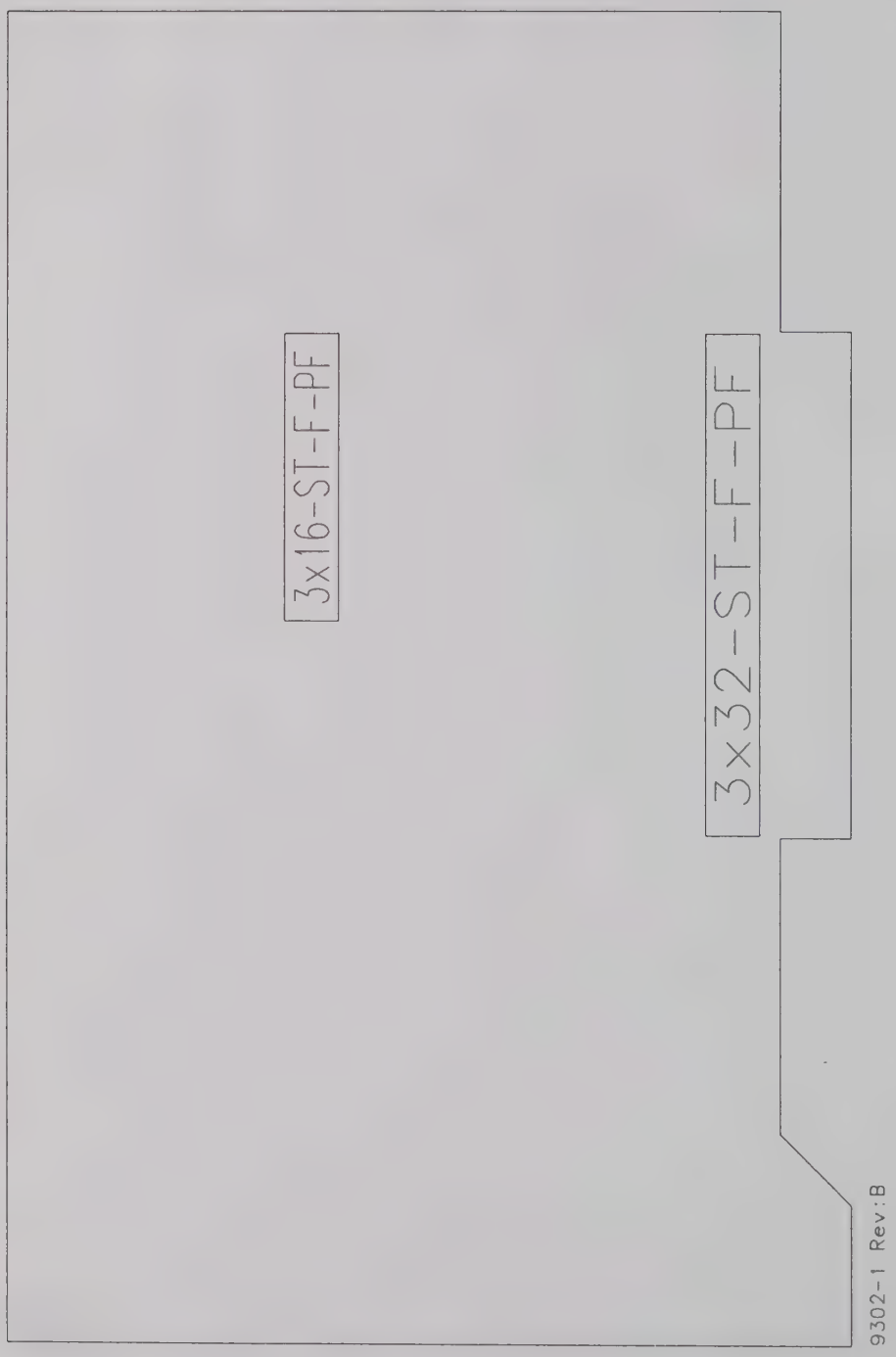


9302-1 Rev:B
40450068
454511020
454511014
MDS410
EPROM
EPROM
453250072
453250072
455410096
SM207668882
SM227132830
MNX401
454511040
205750000
454314016


9302-1 Rev:B
2X34-RA-CGS
2x10-RA-M-RE
2x7-RA-M-RE
BAT-2,4V-50
VISION-C
SMBT475
MDS410
EPROM
EPROM
DRAMOD72
DRAMOD72
3x32-RA-M-SC
CARTON-B
BUTANE-A
SERAIL-B
SOLDAT-A
COPAIN-A
MAXIME-A
MINIME-A
INTIME-B
SM68882FN
SM68EC030FE
CONRAD-A
TRICOT-A
RASOIR-A
C16R6L
MNX401
2x20-RA-M-RE


J1
J2
9302-1 Rev:B


454223048
454220096
9302-1 Rev:B


3x16-ST-F-PF
3x32-ST-F-PF
9302-1 Rev:B

PART: F9302-1-4 **DESC : PROCESSOR with 4 Mb for 9360**

Location	Part Number	Description
A1	SM205010153	SERAIL-B
A2	SM205010150	CARTON-B
A3	SM206885245	SM74ABT245
A4	SM207178541	SM74HCT541
A5	SM205219264	SM6264-7
A6	SM205219264	SM6264-7
A7	SM205010154	SOLDAT-A
A8	SM207178541	SM74HCT541
A9	SM206885245	SM74ABT245
A10	SM205010200	BUTANE-A
A12	453250072	DRAMOD72
A13	SM207178541	SM74HCT541
A14	SM207178541	SM74HCT541
A15	SM207179244	SM74HCT244
A17	SM205010151	COPAIN-A
A18	MNX401	MNX401
A19	SM227132830	SM68EC030FE
A20	SM206884623	SM74ABT623
A21	SM207970139	SM74F139
A22	SM200178002	SM74HCT02
A23	SM200344174	SM74HCT174
A24	SM200172138	SM74F138
A25	SM205219256	SM62256-8
A26	SM208780109	SM1109-12
A27	SM200178032	SM74HCT32
A28	SM206884623	SM74ABT623
A29	SM206885245	SM74ABT245
A30	SM208780109	SM1109-12
A32	SM208470358	SMLM358
A33	SM205010257	MINIME-A
A34	SM205010252	MAXIME-A
A35	SM205010102	INTIME-B
A36	SM207668882	SM68882FN
A39	SM206884623	SM74ABT623
A40	EPROM	EPROM
A41	SM205144001	SM28F008SA
A42	SM206885245	SM74ABT245
A43	EPROM	EPROM
A44	SM206884623	SM74ABT623
A45	SM208680916	SM88916
A46	SM205010156	VISION-C
A48	453250072	DRAMOD72
A49	205750000	C16R6L
A50	SM201186574	SM74AC574
A51	MDS410	MDS410
A52	SM205010103	RASOIR-A
A53	SM205701070	SRAM 128Kx8
A54	SM205219256	SM62256-8
A55	SM207260475	SMBT475
A56	SM206884623	SM74ABT623
A57	SM207972157	SM74F157A
A58	SM207972157	SM74F157A
A59	SM205010155	TRICOT-A
A60	SM208277770	SMTL7770-5
A61	SM207972157	SM74F157A
A63	SM205010101	CONRAD-A
A64	SM205219256	SM62256-8
A65	SM206884623	SM74ABT623
A66	SM200276068	SM68HC68T1
A67	SM206884623	SM74ABT623
A68	SM206884623	SM74ABT623
B1	312590070	BAT-2.4V-50
C1	SM661207104	SM.1uFS
C2	SM661207103	SM.01uFS
C3	SM661207102	SM.001uFS
C4	SM661207104	SM.1uFS
C5	SM661207104	SM.1uFS
C6	SM661207103	SM.01uFS
C7	SM661207103	SM.01uFS
C8	SM661207104	SM.1uFS
C9	SM661207103	SM.01uFS
C10	SM661207103	SM.01uFS
C11	SM661207103	SM.01uFS
C12	SM661207103	SM.01uFS
C13	SM661207104	SM.1uFS
C14	SM661207104	SM.1uFS
C15	SM661207104	SM.1uFS
C16	SM661207103	SM.01uFS
C17	SM661207103	SM.01uFS
C18	SM661207104	SM.1uFS
C19	SM661207104	SM.1uFS
C20	SM661207103	SM.01uFS
C21	SM661207103	SM.01uFS
C22	SM661207104	SM.1uFS
C23	SM661255101	SM100pFS
C24	SM661207103	SM.01uFS
C25	SM661255101	SM100pFS
C26	SM661207104	SM.1uFS

PART: F9302-1-4 **DESC : PROCESSOR with 4 Mb for 9360**

Location	Part Number	Description
C27	SM661207104	SM.1uFS
C28	SM661207104	SM.1uFS
C29	SM666377226	SM22uF-15V
C30	SM661207104	SM.1uFS
C31	SM666377226	SM22uF-15V
C32	SM661207103	SM.01uFS
C33	SM661207103	SM.01uFS
C34	SM661207103	SM.01uFS
C35	SM661207104	SM.1uFS
C36	SM661207104	SM.1uFS
C37	SM666377226	SM22uF-15V
C38	SM666327225	SM2.2uF-20V
C39	SM666377226	SM22uF-15V
C40	SM661207104	SM.1uFS
C41	SM661207104	SM.1uFS
C42	SM661207104	SM.1uFS
C43	SM661207103	SM.01uFS
C44	SM661207103	SM.01uFS
C45	SM661207103	SM.01uFS
C46	SM661207103	SM.01uFS
C47	SM661207103	SM.01uFS
C48	SM661207104	SM.1uFS
C50	SM661207104	SM.1uFS
C51	SM661207104	SM.1uFS
C52	SM661207103	SM.01uFS
C53	SM661207103	SM.01uFS
C55	SM661207104	SM.1uFS
C56	SM661207103	SM.01uFS
C57	SM661207104	SM.1uFS
C58	SM661207104	SM.1uFS
C59	SM661207104	SM.1uFS
C60	SM666217106	SM10uF-10V
C61	SM661207104	SM.1uFS
C62	SM661207103	SM.01uFS
C63	SM661207103	SM.01uFS
C64	SM661207104	SM.1uFS
C65	SM661207103	SM.01uFS
C66	SM661207103	SM.01uFS
C68	SM661207104	SM.1uFS
C69	SM661207103	SM.01uFS
C70	SM661207103	SM.01uFS
C71	SM661207103	SM.01uFS
C72	SM661207103	SM.01uFS
C73	SM661207104	SM.1uFS
C74	SM661207104	SM.1uFS
C75	SM661207104	SM.1uFS
C76	SM661255180	SM18pFS
C77	SM661207104	SM.1uFS
C78	SM666217106	SM10uF-10V
C79	SM661207103	SM.01uFS
C80	SM661207103	SM.01uFS
C81	SM661207103	SM.01uFS
C82	SM666377226	SM22uF-15V
C83	SM666377226	SM22uF-15V
C84	SM661207104	SM.1uFS
C85	SM661255180	SM18pFS
C86	SM661207103	SM.01uFS
C87	SM661207104	SM.1uFS
C88	SM661207103	SM.01uFS
C89	SM661207103	SM.01uFS
C90	SM661207104	SM.1uFS
C91	SM661207103	SM.01uFS
C92	SM661207103	SM.01uFS
C93	SM661207103	SM.01uFS
C94	SM661207103	SM.01uFS
J1	455410096	3x32-RA-M-SC
J2	454220096	3x32-ST-F-PF
J3	404500068	2x34-RA-CGS
J4	454511020	2x10-RA-M-RE
J5	454511040	2x20-RA-M-RE
J6	454511014	2x7-RA-M-RE
J7	454223048	3x16-ST-F-PF
L1	SM300056332	SM33uH
L2	SM300056332	SM33uH
L3	SM301502001	SMBEAD1206
Q1	SM280171005	MTD10N05E
Q2	SM270330848	BC848C
Q3	SM270330848	BC848C
R1	SM652101103	SM10KS
R2	SM652101103	SM10KS
R3	SM652101103	SM10KS
R4	SM652101103	SM10KS
R5	SM652101103	SM10KS
R6	SM652101220	SM22S
R7	SM652101220	SM22S
R8	SM652101220	SM22S
R9	SM652101220	SM22S
R10	SM652101220	SM22S

PART: F9302-1-4 **DESC : PROCESSOR with 4 Mb for 9360**

Location	Part Number	Description
R11	SM652101103	SM10KS
R12	SM652101102	SM1KS
R13	SM652101102	SM1KS
R14	SM652101103	SM10KS
R15	SM652101820	SM82S
R16	SM652101103	SM10KS
R17	SM652101220	SM22S
R18	SM652101220	SM22S
R19	SM652101220	SM22S
R20	SM652101220	SM22S
R21	SM652101103	SM10KS
R22	SM652101103	SM10KS
R23	SM652101220	SM22S
R24	SM652101103	SM10KS
R25	SM652101511	SM510S
R26	SM652101103	SM10KS
R27	SM652101103	SM10KS
R28	SM652101102	SM1KS
R29	SM652101103	SM10KS
R30	SM652101102	SM1KS
R31	SM652101103	SM10KS
R32	SM652101102	SM1KS
R34	SM652101102	SM1KS
R35	SM652101103	SM10KS
R36	SM652101103	SM10KS
R37	SM652101220	SM22S
R38	SM652101103	SM10KS
R39	SM652101103	SM10KS
R40	SM652101103	SM10KS
R41	SM652101102	SM1KS
R42	SM652101102	SM1KS
R43	SM652101103	SM10KS
R44	SM652101102	SM1KS
R45	SM652101102	SM1KS
R46	SM652101103	SM10KS
R47	SM652101103	SM10KS
R48	SM652101102	SM1KS
R49	SM652101102	SM1KS
R50	SM652101220	SM22S
R51	SM652101102	SM1KS
R52	SM652101220	SM22S
R53	SM652101102	SM1KS
R54	SM652101102	SM1KS
R55	SM652101220	SM22S
R57	SM652101220	SM22S
R58	SM652101102	SM1KS
R59	SM652101104	SM100KS
R61	SM652101220	SM22S
R62	SM652101102	SM1KS
R63	SM652101104	SM100KS
R65	SM652101103	SM10KS
R66	SM652101102	SM1KS
R67	SM652101820	SM82S
R68	SM652101102	SM1KS
R69	SM652101102	SM1KS
R70	SM652101102	SM1KS
R71	SM652101102	SM1KS
R72	SM652101102	SM1KS
R73	SM652101103	SM10KS
R75	SM652101101	SM100S
R76	SM652101103	SM10KS
R77	SM652101101	SM100S
R78	SM652101101	SM100S
R79	SM652101220	SM22S
R80	SM652101103	SM10KS
R81	SM652101103	SM10KS
R82	SM652101470	SM47S
R83	SM652101474	SM470KS
R84	SM652101331	SM330S
R85	SM652101470	SM47S
R86	SM652101103	SM10KS
R87	SM652101102	SM1KS
R88	SM654101000	SM0S
R89	SM652101220	SM22S
R90	SM652101220	SM22S
R91	SM652101220	SM22S
R92	SM652101220	SM22S
R93	SM652101220	SM22S
R94	SM652101220	SM22S
R95	SM652101220	SM22S
R96	SM652101220	SM22S
R97	SM652101220	SM22S
R98	SM652101220	SM22S
R99	SM652101103	SM10KS
R100	SM652101332	SM3.3KS
R101	SM652101221	SM220S
R102	SM652101102	SM1KS
R103	SM652101152	SM1.5KS

PART: F9302-1-4 **DESC : PROCESSOR with 4 Mb for 9360**

Location	Part Number	Description
R104	SM652101101	SM100S
R105	SM652101102	SM1KS
R106	SM652101221	SM220S
R107	SM652101820	SM82S
R108	SM652101152	SM1.5KS
R109	SM652101154	SM150KS
R110	SM652101152	SM1.5KS
R111	SM652101152	SM1.5KS
R112	SM652101106	SM10MS
R115	SM652101103	SM10KS
R116	SM652101220	SM22S
R117	SM652101220	SM22S
R118	SM652101220	SM22S
R119	SM652101220	SM22S
R120	SM652101103	SM10KS
R121	SM652101102	SM1KS
R123	SM652101820	SM82S
R124	SM652101153	SM15KS
R125	SM652101103	SM10KS
R126	SM652101153	SM15KS
R127	SM652101102	SM1KS
R129	SM652101103	SM10KS
S1	SM654101000	SM0S-2P
S2	SM654101000	SM0S-2P
S3	SM654101000	SM0S-2P
Y1	SM311248000	SMOSC48MHz
Y2	309380016	16.000MHZ
Y3	SM310300406	SM32.768KHz
CR1	SM232032814	HSMS2814
CR3	SM232032814	HSMS2814
CR4	SM232032814	HSMS2814
CR5	SM236030099	BAV99 SOT23
CR6	SM232032814	HSMS2814
CR7	SM256232013	SLM-13V
TP1	454314016	2x8-ST-M-NW

PART: F9302-1-4 **DESC: PROCESSOR CARD with 4MB DRAM for 9360**

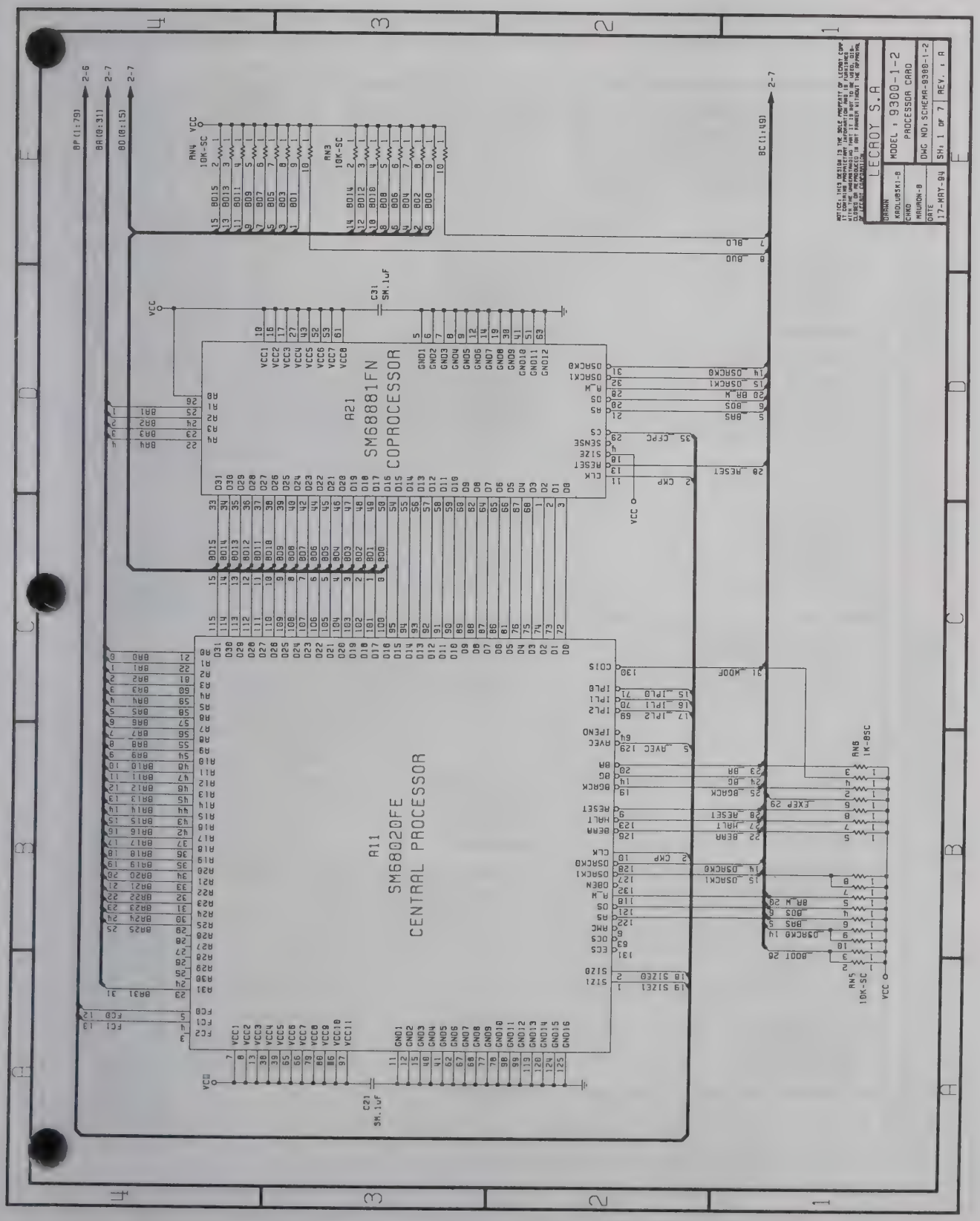
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205800130	MODULE DRAM 1MX32 BIT	1
454370002	SHUNT 2 POS	2
S9302-1	PROCESSOR CARD WHOUT DRAM	1

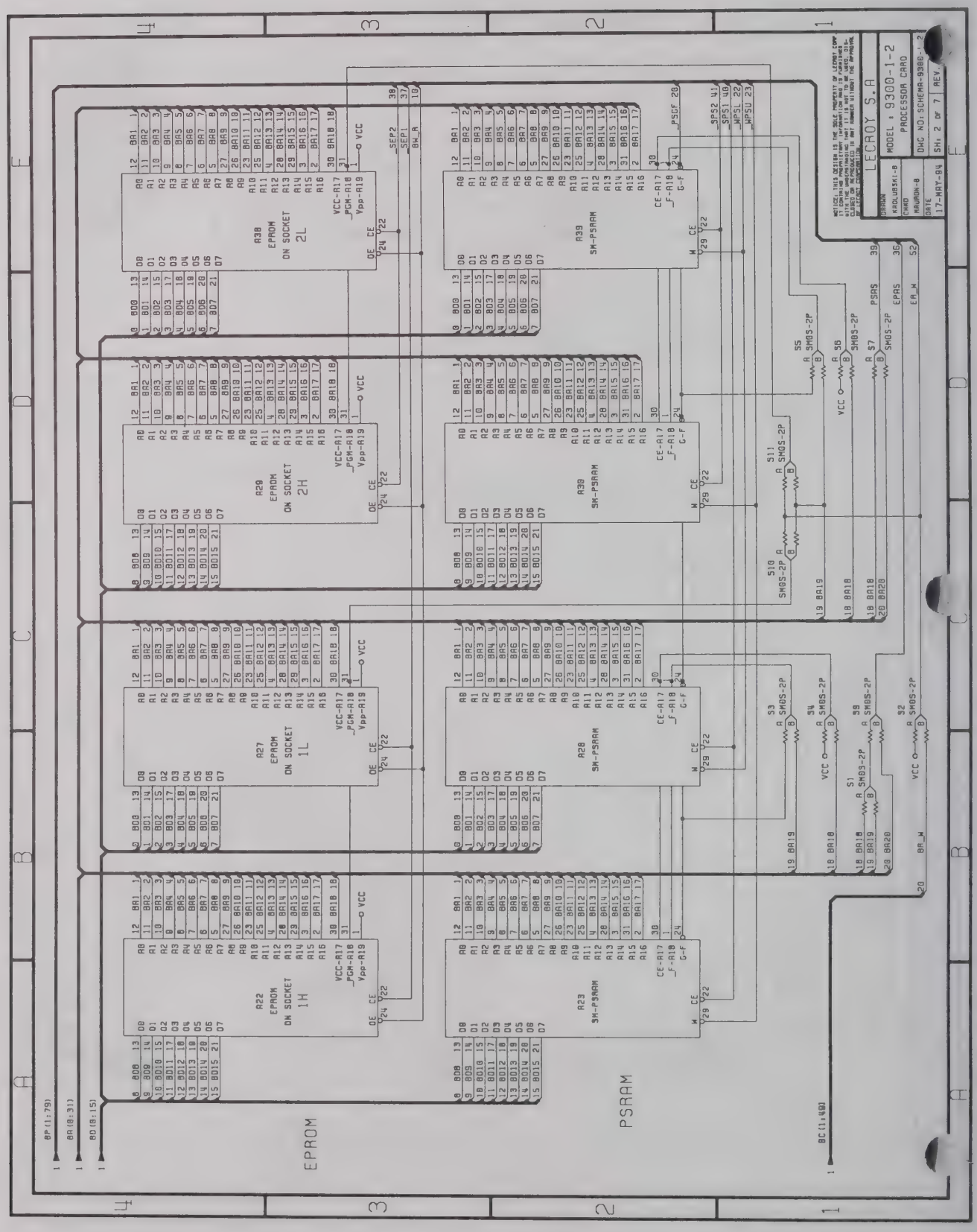
PART: S9302-1 **DESC: PROCESSOR CARD without DRAM**

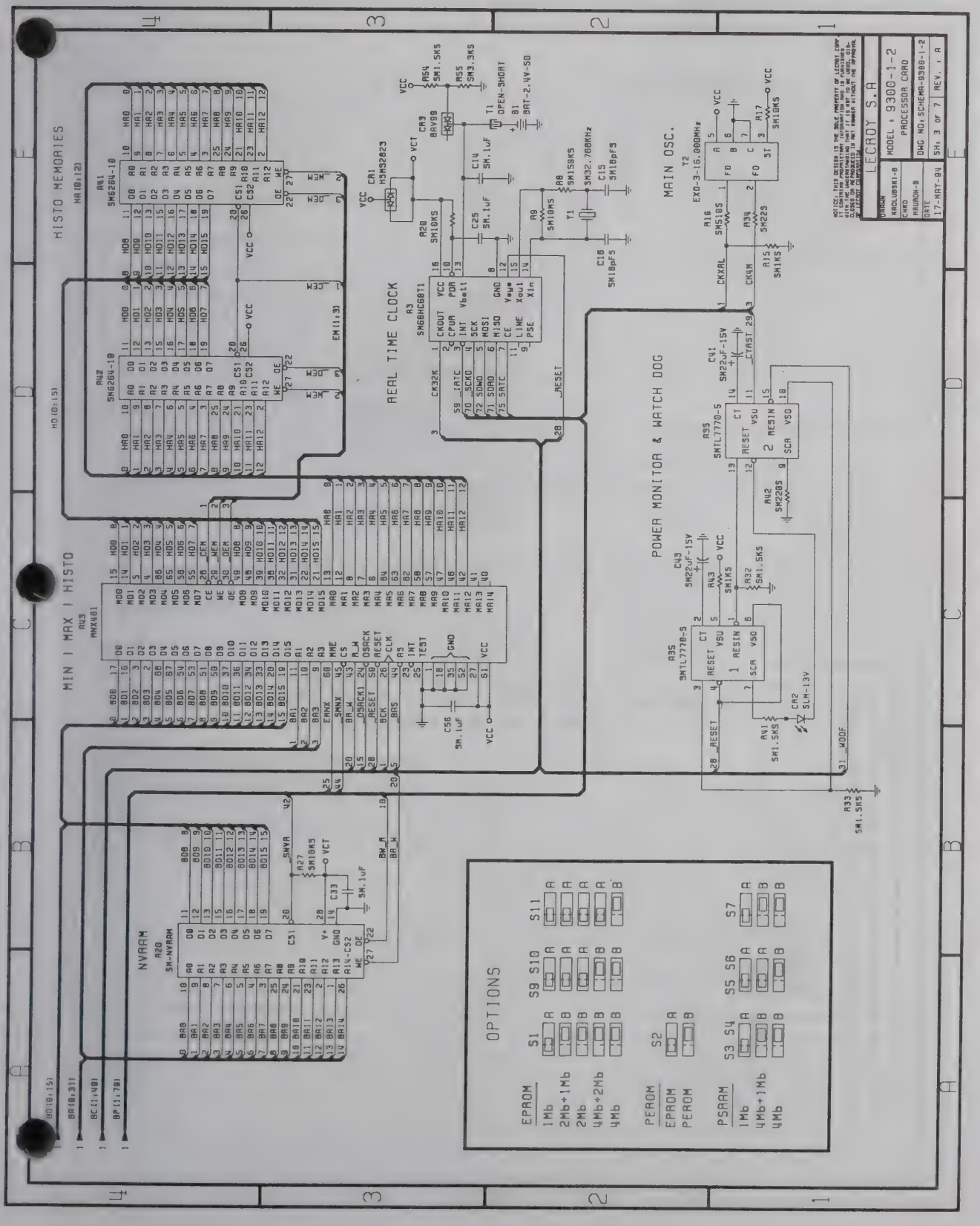
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
309380016	CRYSTAL OSC (PROGR) 16 MHZ	1
312590070	BATTERY LITHIUM 3V 70MAH	1
400331020	SOCKET IC ST DIP-20	1
404500068	CONN BD TO BD 68 POS	1
453250072	CONN PC EDGE/SOLD TAIL 72	2
454314016	HDR DIP SOLD TO MALE 16	1
454511014	HDR SOLD TAIL/MALE/14/RT	1
454511020	HDR SOLD TAIL/MALE 20	1
454511040	HDR SOLD TAIL/MALE/40/RT	1
455410096	CONN RT ANGLE MALE 96 S-CLIP	1
550130108	SCREW CYL HD M3X8	2
552130101	NUT HEX M3	2
719302103	PC BD PREASS'Y 9302-1	1
MDS410	IC RSDP GATE ARRAY MDS410	1
MNX401	ICMIN MAX GATEARR. MNX401	1
SM200172138	IC 3-8 DECODER 74F138	1
SM200178002	IC 2-INPUT NOR HCT02	1
SM200178032	IC 2-IN OR HCT32	1
SM200276068	IC RTC SERIAL 68HC68T1	1
SM200344174	IC HEX D-FLOP HCT174	1
SM201186574	IC OCTAL D-TYP FLOP 74AC574	1
SM205010101	PROGRAMMED GAL CONRAD-A	1
SM205010102	PROGRAMMED GAL INTIME-B	1
SM205010103	PROGRAMMED GAL RASOIR-A	1
SM205010150	PROGRAMMED GAL CARTON-B	1
SM205010151	PROGRAMMED GAL COPAIN-A	1
SM205010153	PROGRAMMED GAL SERAIL-C	1
SM205010154	PROGRAMMED GAL SOLDAT-A	1
SM205010155	PROGRAMMED GAL TRICOT-A	1
SM205010156	PROGRAMMED GAL VISION-C	1
SM205010200	PROGRAMMED GAL BUTANE-A	1
SM205010252	PROGRAMMED GAL MAXIME-A	1
SM205010257	PROGRAMMED GAL MINIME-A	1
SM205144001	8-MBIT FLASH MEM 28F008SA	1
SM205219256	IC 32K X 8 SRAM MS62256	3
SM205219264	IC 8K X 8 SRAM 70 NSEC 6264	2
SM205701070	IC 128KX8 STAT RAM 70 NS	1
SM206884623	IC OCTAL BUS TRANSCVR ABT623	8
SM206885245	IC BUS TRANSCVR ABT245	4
SM207178541	IC BUFFER/LINE DR HCT541	4
SM207179244	IC BUF/LINE DRIV HCT244	1
SM207260475	IC RAMDAC 256W 50MHZ BT475	1
SM207668882	IC CO PROCESSOR 68882	1
SM207970139	IC DECODER/DEMUX 74F139	1

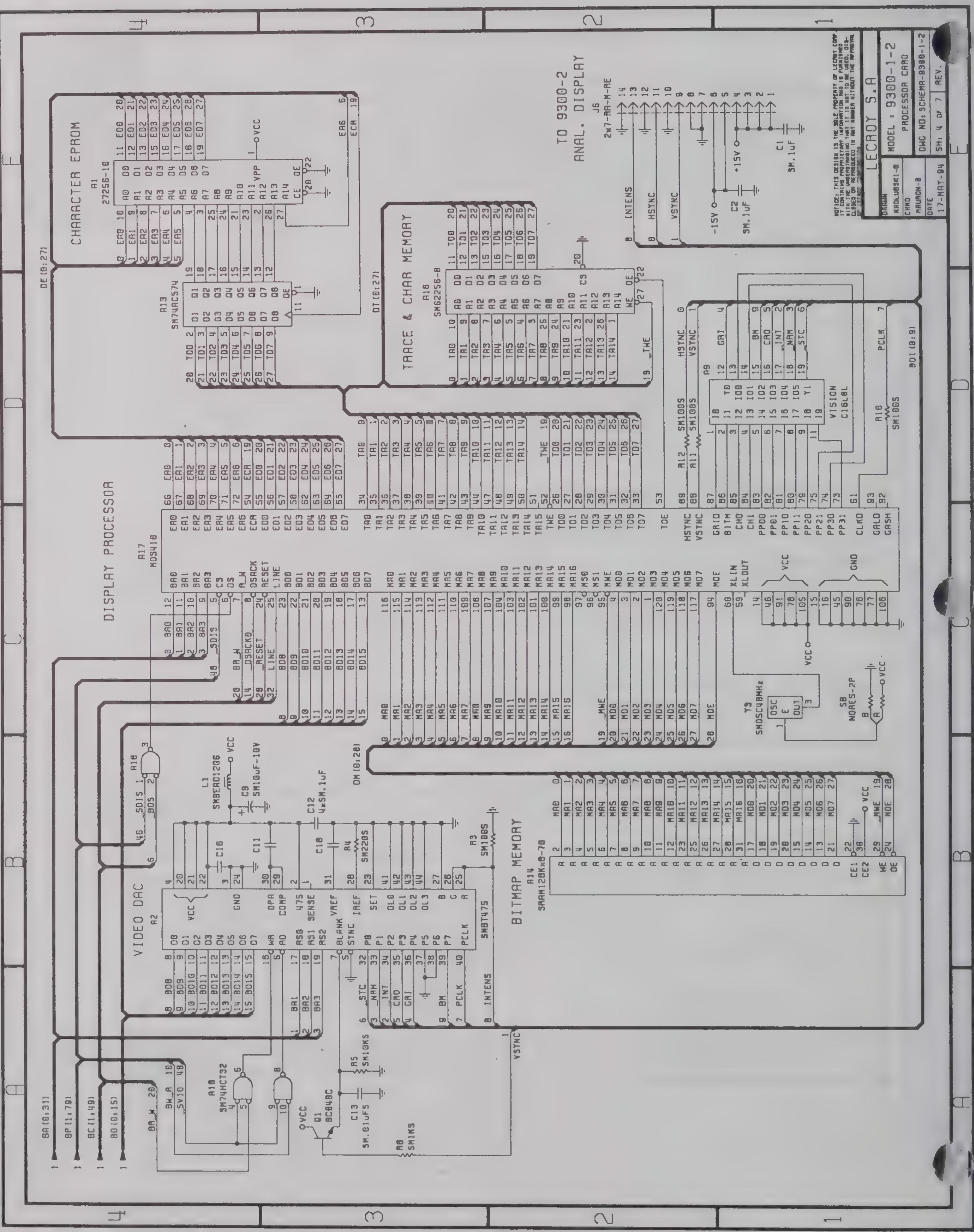
PART: S9302-1 **DESC: PROCESSOR CARD without DRAM**

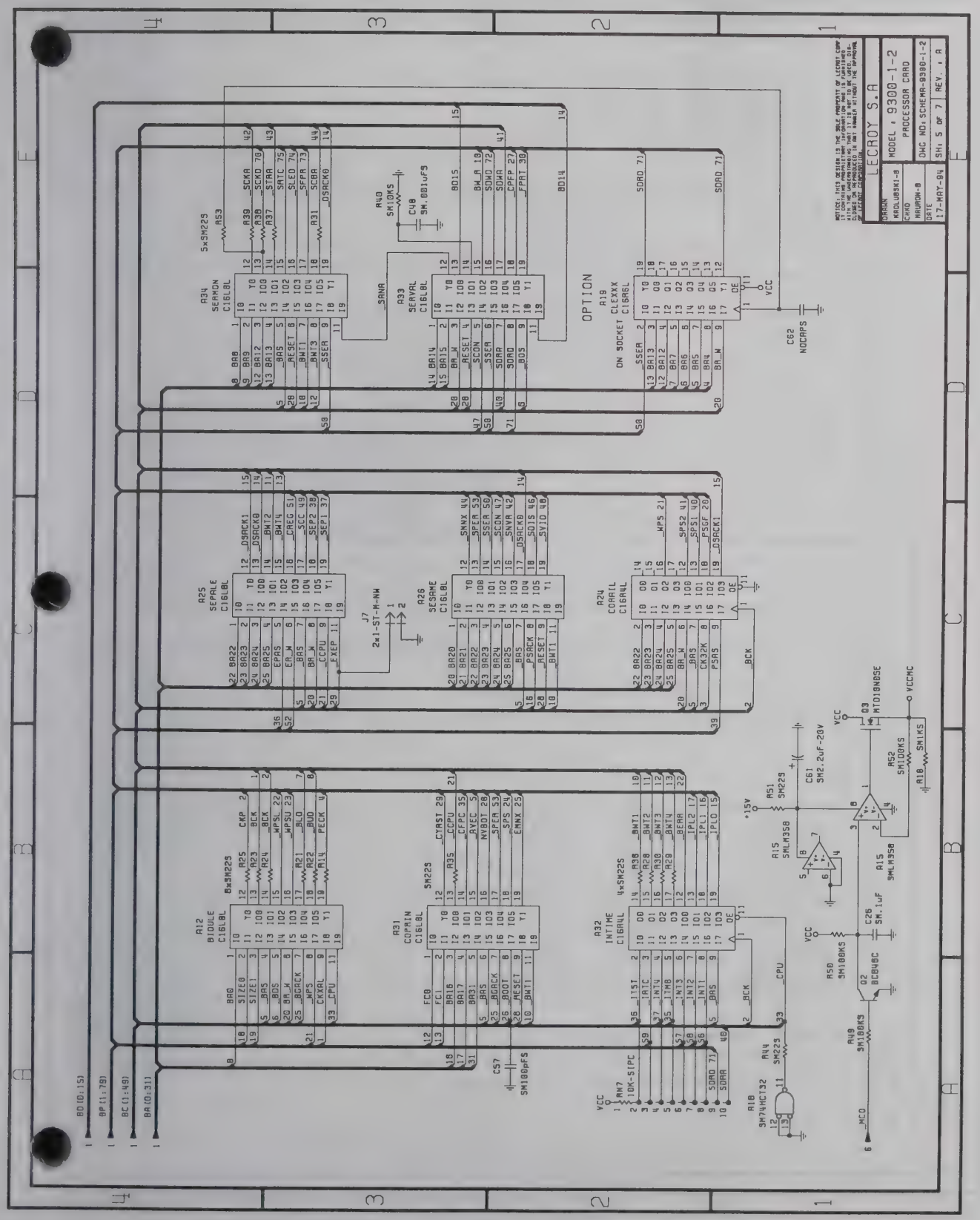
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM207972157	IC DATA SEL/MUX 74F157A	3
SM208277770	IC DUAL PWR SUPPLY SUP 7770-5	1
SM208470358	IC DUAL OP AMP 358D	1
SM208680916	IC LOW SKEW CLOCK DRIVER 88916	1
SM208780109	IC MICROPOWER DC-DC CONV.	2
SM227132830	IC 32-BIT U PROC 68EC030	1
SM232032814	DIODE 2814	4
SM236030099	DIODE SO-PKG BAV99	1
SM256232013	DIODE LIGHT EMITTING RED	1
SM270330848	TRANSISTOR NPN BC848C	2
SM280171005	TRANS POWER MOSFET MTD10N05E	1
SM300056332	INDUCTOR WOUND 33 UH	2
SM301502001	BEAD (FERRITE CHIP)	1
SM310300406	CRYSTAL 32768HZ	1
SM311248000	CRYSTAL OSCILLATOR 48MHZ	1
SM652101101	RES CHIP (E24) 1% 100 OHM	4
SM652101102	RES CHIP (E24) 1% 1 K	28
SM652101103	RES CHIP (E24) 1% 10 K	34
SM652101104	RES CHIP (E24) 1% 100 K	2
SM652101106	RES CHIP (E24) 1% 10 MEG	1
SM652101152	RES CHIP (E24) 1% 1.5 K	4
SM652101153	RES CHIP (E24) 1% 15 K	2
SM652101154	RES CHIP (E24) 1% 150 K	1
SM652101220	RES CHIP (E24) 1% 22 OHMS	31
SM652101221	RES CHIP (E24) 1% 220 OHM	2
SM652101331	RES CHIP (E24) 1% 330 OHM	1
SM652101332	RES CHIP (E24) 1% 3.3 K	1
SM652101470	RES CHIP (E24) 47 OHMS	2
SM652101474	RES CHIP (E24) 1% 470 K	1
SM652101511	RES CHIP (E24) 1% 510 OHM	1
SM652101820	RES CHIP (E24) 1% 82 OHMS	4
SM654101000	CHIP JUMPER ZERO OHMS	4
SM661207102	CAP CERA CHIP 10% .001UF	1
SM661207103	CAP CERA CHIP 20% .01UF (0805)	41
SM661207104	CAP CERA CHIP 20% .1 UF	36
SM661255101	CAP CERA CHIP 5% 100 PF	2
SM661255180	CAP CERA CHIP 5% 18PF	2
SM666217106	CAP MOLD TANT CHIP 10 UF	2
SM666327225	CAP MOLD TANT CHIP 2.2 UF	1
SM666377226	CAP MOLD TANT CHIP 22 UF	6

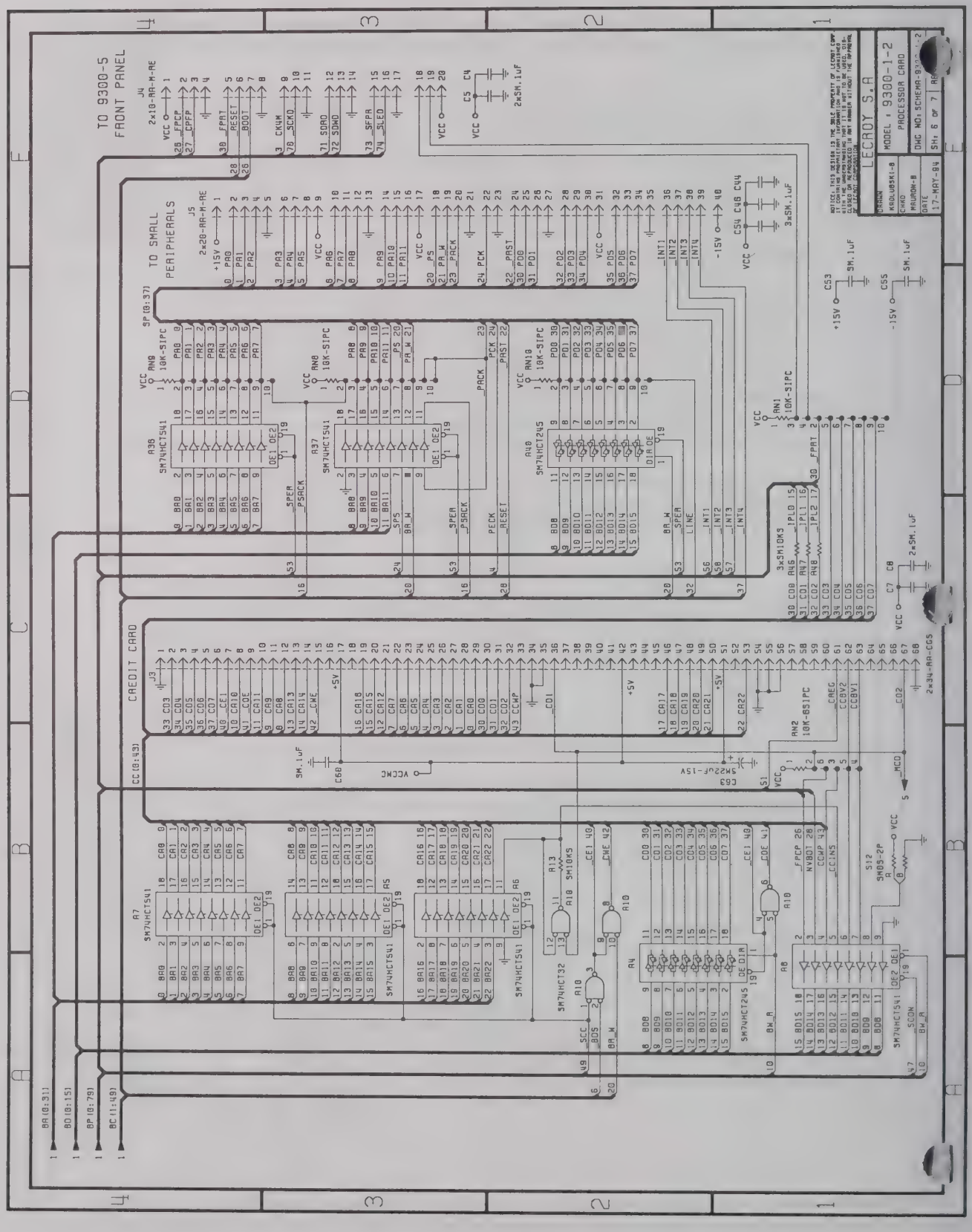

LECROY S.A
MODEL : 9300-1-2
PROCESSOR CARD
DWG NO: SCHEMA-9300-1-2
SH: 1 OF 7
REV. : A
17-MAY-94
A21
SM68881FN
COPROCESSOR
A11
SM68020FE
CENTRAL PROCESSOR

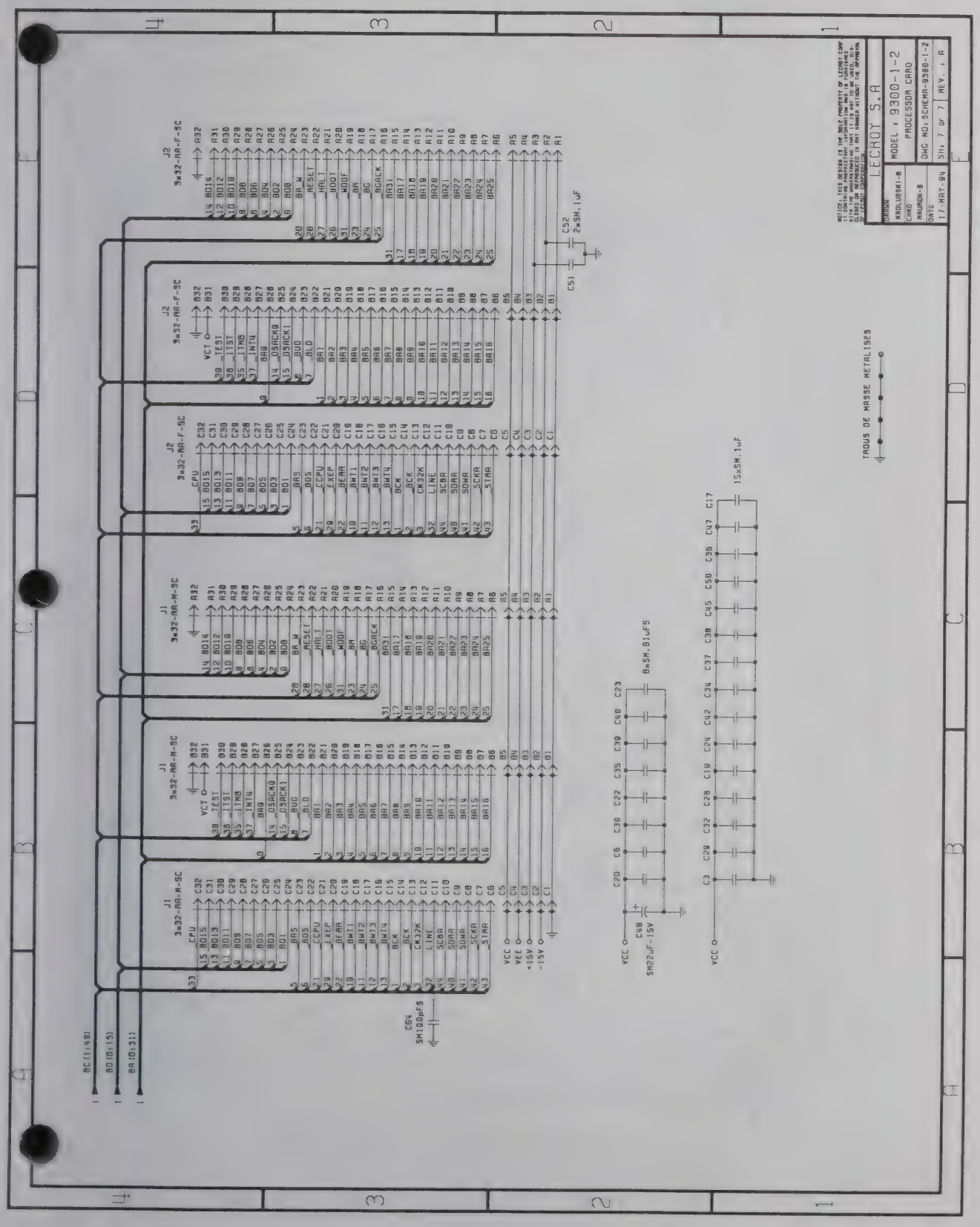

LECROY S.A
MODEL : 9300-1-2
PROCESSOR CARD
DWG NO: SCHEMA-9300-1-2
SH: 2 OF 7
REV.
DRAWN KAOLUBSKI-B
CHKD MAURON-B
DATE 17-MAY-94
A38 EPROM ON SOCKET 2L
A39 SM-PSRAM
A29 EPROM ON SOCKET 2H
A30 SM-PSRAM
A27 EPROM ON SOCKET 1L
A28 SM-PSRAM
A22 EPROM ON SOCKET 1H
A23 SM-PSRAM
EPROM
PSRAM


HISTO MEMORIES
MIN I MAX I HISTO
REAL TIME CLOCK
MAIN OSC.
POWER MONITOR & WATCH DOG
NVRAM
OPTIONS
LECROY S.A
MODEL : 9300-1-2
PROCESSOR CARD
DWG NO: SCHEMA-9300-1-2
SH. 3 OF 7
REV. : A
17-MAR-94

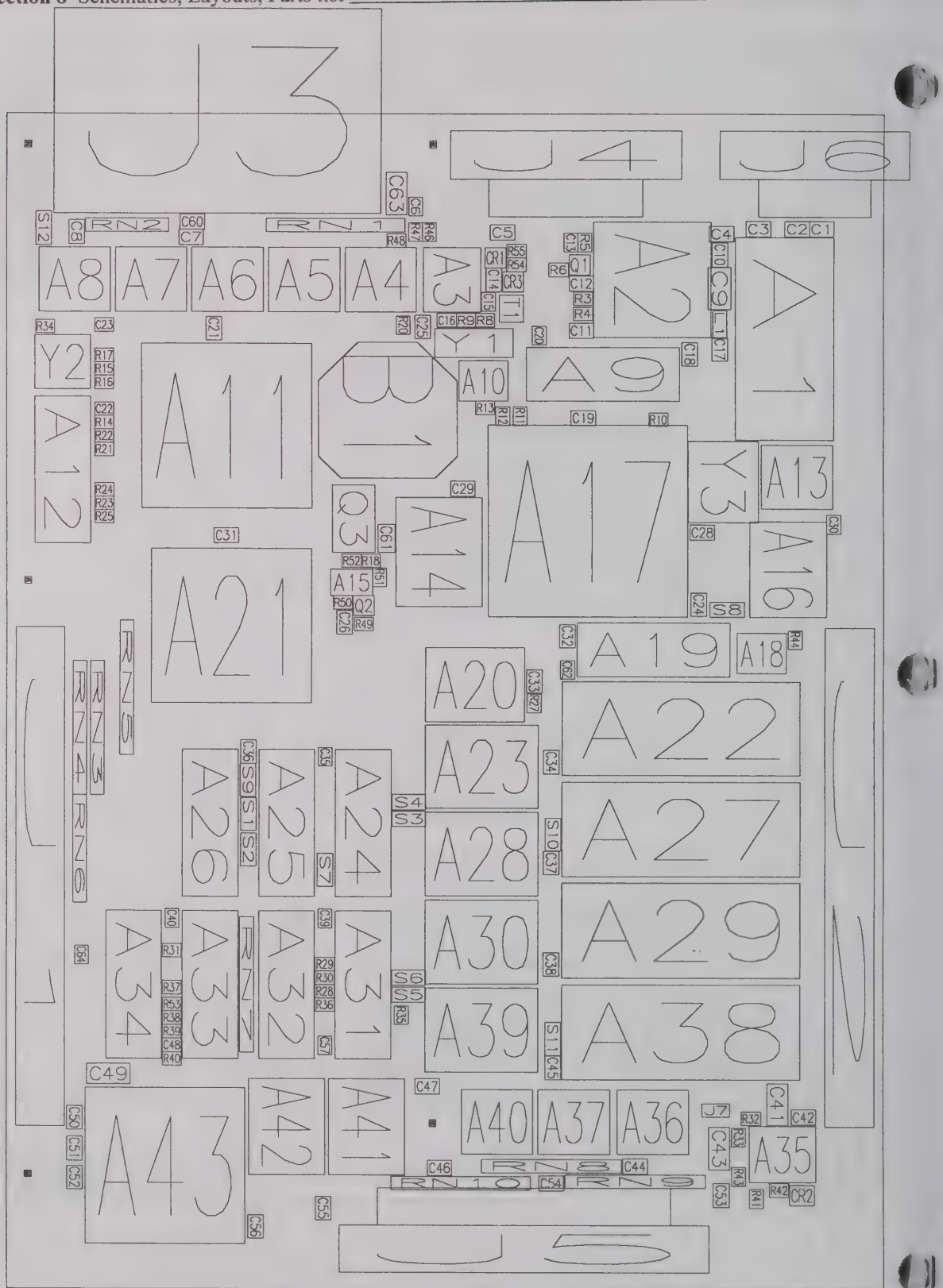

DISPLAY PROCESSOR
R17
MD5410
CHARACTER EPROM
R1
27256-10
R13
SM74AC574
TRACE & CHAR MEMORY
R16
SM62256-8
TO 9300-2
ANAL. DISPLAY
J6
VIDEO DAC
R2
SMBT475
BITMAP MEMORY
R14
SRAM128Kx8-70
R18
SM74HCT32
Q1
BC848C
Y3
SMOSC40MHz
VISION
C16L8L
LECROY S.A
MODEL : 9300-1-2
PROCESSOR CARD
DWG NO: SCHEMA-9300-1-2
SH: 4 OF 7
17-MAY-94
KADLUBSKI-B
MAURON-B

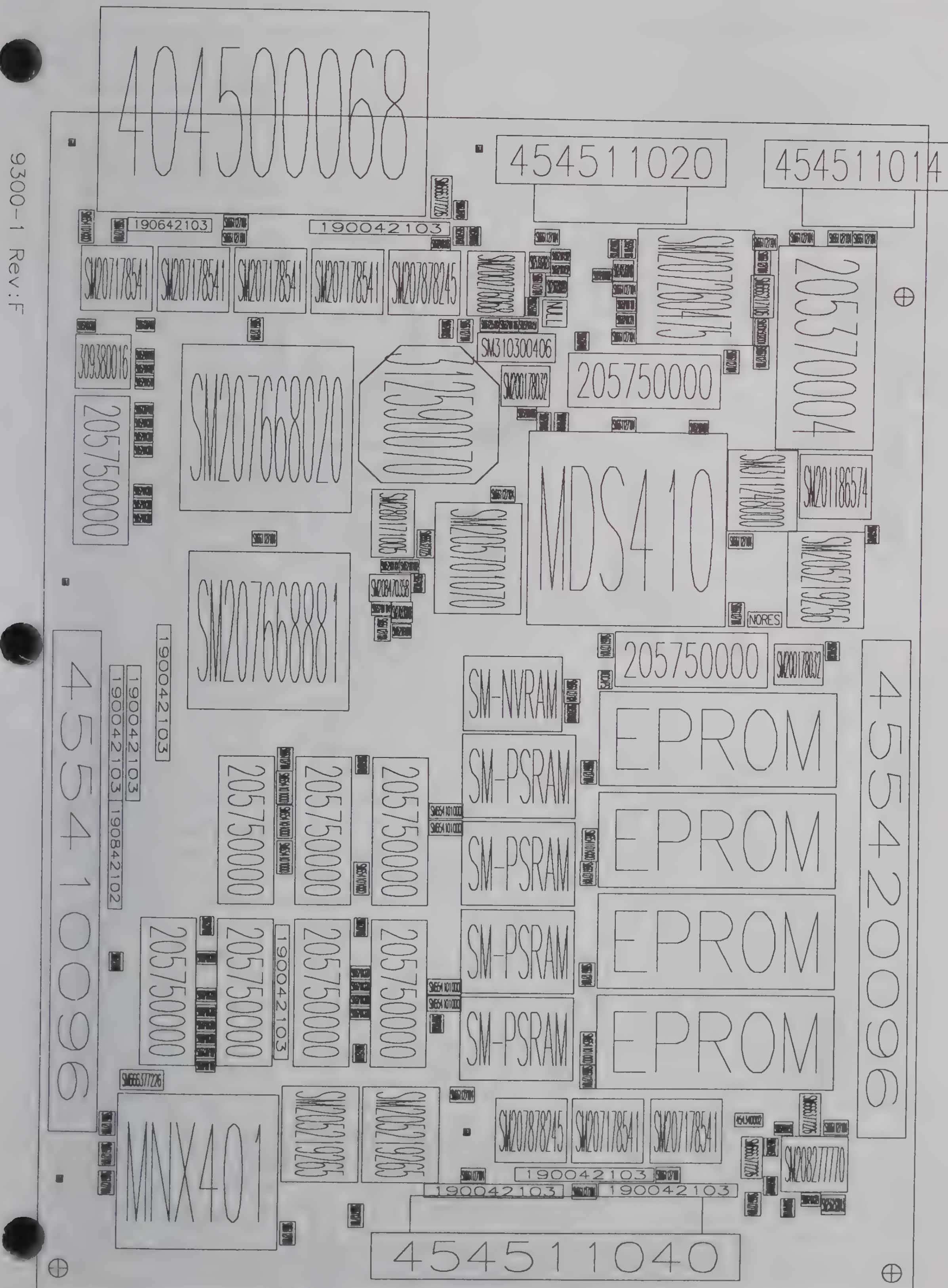

LECROY S.A
MODEL : 9300-1-2
PROCESSOR CARD
DWG NO: SCHEMA-9300-1-2
SH: 5 OF 7
REV. : A
DRAWN KADLUBSKI-B
CHKD MAURON-B
DATE 17-MAY-94
OPTION
A34 SERMON C16L8L
A33 SERVAL C16L8L
A19 CLEXXX C16R6L
A25 SEPALE C16L8L
A26 SESAME C16L8L
A24 CORAIL C16R4L
A12 BIDULE C16L8L
A31 COPRIN C16L8L
A32 INTIME C16R4L
J7 2x1-ST-M-NW
A15 SMLM358
A18 SM74HCT32
Q2 BC848C
Q3 MTD10N05E
VCC
VCCMC
+15V
BD(0:15)
BP(1:79)
BC(1:49)
BA(0:31)


TO 9300-5
FRONT PANEL
TO SMALL
PERIPHERALS
CREDIT CARD
LECROY S.A
MODEL : 9300-1-2
PROCESSOR CARD
DWG NO: SCHEMA-9300-1-2
SH: 6 OF 7 REV
17-MAY-84

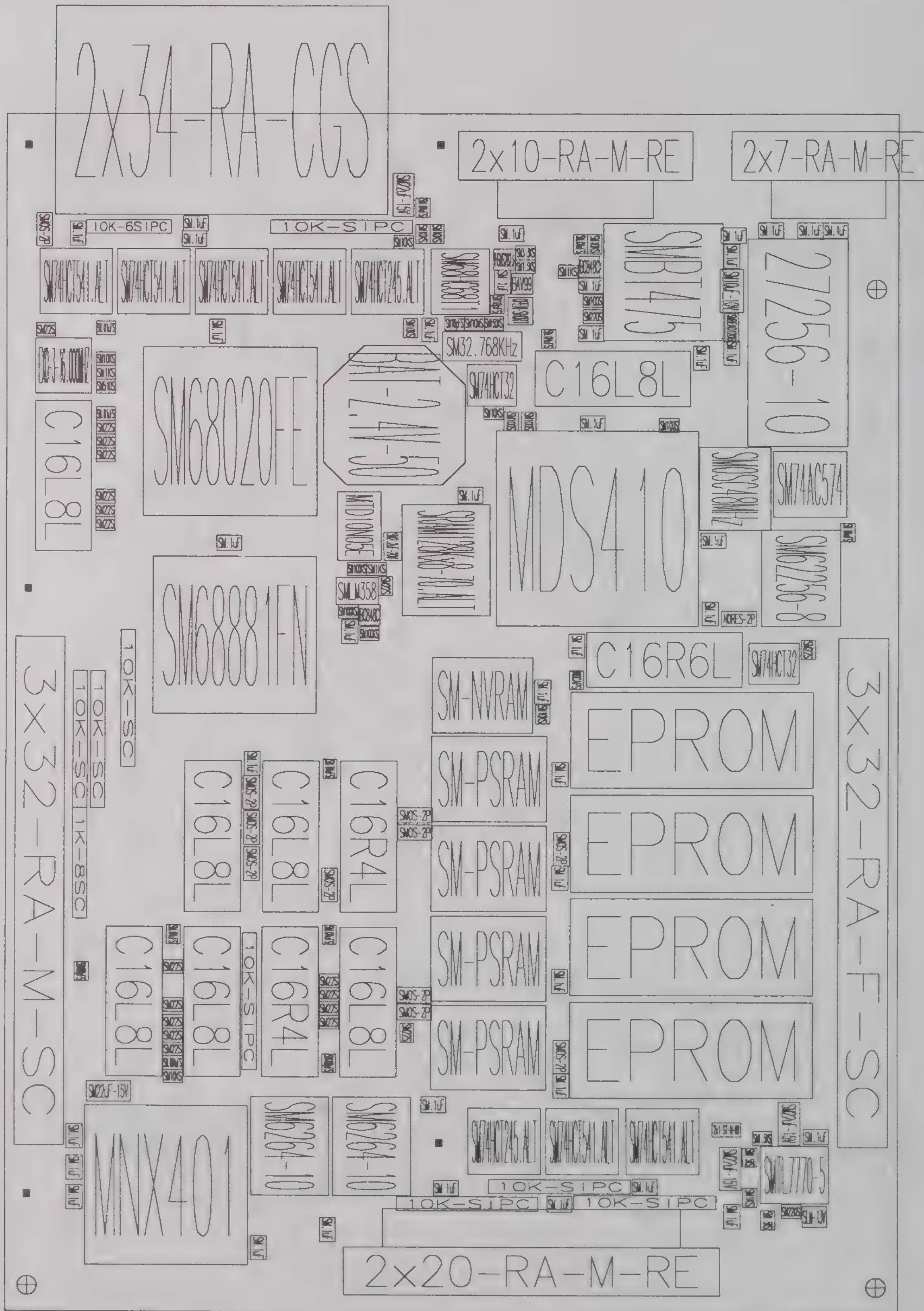

LECROY S.A
MODEL : 9300-1-2
PROCESSOR CARD
DWG NO: SCHEMA-9300-1-2
SH: 7 OF 7
REV. : A
DATE 17-MAY-94
TRAOUS DE MASSE METALISES
J1 3x32-AA-M-SC
J2 3x32-AA-F-SC
J1 3x32-MA-M-SC
J2 3x32-MA-F-SC
C64 SM100pFS
C48 SM22uF-15V
8xSM.01uFS
15xSM.1uF
C51 C52 2xSM.1uF
VCC
VEE
+15V
-15V
BC(1:49)
BD(0:15)
BA(0:31)

9300-1 Rev:F


J3
J4
J6
J5
J7
J1
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
A15
A16
A17
A18
A19
A20
A21
A22
A23
A24
A25
A26
A27
A28
A29
A30
A31
A32
A33
A34
A35
A36
A37
A38
A39
A40
A41
A42
A43
B1
Y1
Y2
Y3
Q1
Q2
Q3
T1
RN1
RN2
RN3
RN4
RN5
RN6
RN7
RN8
RN9
RN10
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
J7
CR1
CR2
CR3
L1


9300-1 Rev:F
404500068
454511020
454511014
205370004
SM207668020
312390070
205750000
MDS410
SM207668881
SM-NVRAM
SM-PSRAM
EPROM
455410096
455420096
MNX401
454511040
190042103
190642103
190842102
SM310300406
NULL
NORES

9300-1 Rev:F


2x34-RA-CGS
2x10-RA-M-RE
2x7-RA-M-RE
10K-6SIPC
10K-SIPC
SM74HCT541.ALT
SM74HCT541.ALT
SM74HCT541.ALT
SM74HCT541.ALT
SM74HCT245.ALT
SMBT475
27256-10
SM32.768KHz
SM68020FE
BAT-2.4V-50
SM74HCT32
C16L8L
C16L8L
MDS410
SM74AC574
SM68881FN
SM-LM358
C16R6L
SM74HCT32
SM-NVRAM
SM-PSRAM
SM-PSRAM
SM-PSRAM
SM-PSRAM
EPROM
EPROM
EPROM
EPROM
3x32-RA-M-SC
3x32-RA-F-SC
10K-SC
10K-SC
10K-SC
1K-8SC
C16L8L
C16L8L
C16R4L
C16L8L
C16L8L
C16R4L
C16L8L
10K-SIPC
MNX401
SM6264-10
SM6264-10
SM74HCT245.ALT
SM74HCT541.ALT
SM74HCT541.ALT
SMTL7770-5
10K-SIPC
10K-SIPC
10K-SIPC
2x20-RA-M-RE

PART: F9300-1-2 DESC: PROCESSOR CARD with 2Mb RAM for 9361

Location	Part Number	Description	Location	Part Number	Description
A1	205370004	27256-10	C2	SM661127104	SM.1uF
A2	SM207260475	SMBT475	C3	SM661127104	SM.1uF
A3	SM200276068	SM68HC68T1	C4	SM661127104	SM.1uF
A4	SM207878245	SM74HCT245	C5	SM661127104	SM.1uF
A5	SM207178541	SM74HCT541	C6	SM661207103	SM.01uF
A6	SM207178541	SM74HCT541	C7	SM661127104	SM.1uF
A7	SM207178541	SM74HCT541	C8	SM661127104	SM.1uF
A8	SM207178541	SM74HCT541	C9	SM666217106	SM10uF-10V
A9	205750000	C16L8L	C10	SM661127104	SM.1uF
A10	SM200178032	SM74HCT32	C11	SM661127104	SM.1uF
A11	SM207668020	SM68020FE	C12	SM661127104	SM.1uF
A12	205750000	C16L8L	C13	SM661207103	SM.01uF
A13	SM201186574	SM74AC574	C14	SM661127104	SM.1uF
A14	SM205701070	SRAM128Kx8	C15	SM661255180	SM18pF
A15	SM208470358	SMLM358	C16	SM661255180	SM18pF
A16	SM205219256	SM62256-8	C17	SM661127104	SM.1uF
A17	MDS410	MDS410	C18	SM661127104	SM.1uF
A18	SM200178032	SM74HCT32	C19	SM661127104	SM.1uF
A19	205750000	C16R6L	C20	SM661207103	SM.01uF
A20	SM-NVRAM	SM-NVRAM	C21	SM661127104	SM.1uF
A21	SM207668881	SM68881FN	C22	SM661207103	SM.01uF
A22	EPROM	EPROM	C23	SM661207103	SM.01uF
A23	SM-PSRAM	SM-PSRAM	C24	SM661127104	SM.1uF
A24	205750000	C16R4L	C25	SM661127104	SM.1uF
A25	205750000	C16L8L	C26	SM661127104	SM.1uF
A26	205750000	C16L8L	C28	SM661127104	SM.1uF
A27	EPROM	EPROM	C29	SM661127104	SM.1uF
A28	SM-PSRAM	SM-PSRAM	C30	SM661207103	SM.01uF
A29	EPROM	EPROM	C31	SM661127104	SM.1uF
A30	SM-PSRAM	SM-PSRAM	C32	SM661127104	SM.1uF
A31	205750000	C16L8L	C33	SM661127104	SM.1uF
A32	205750000	C16R4L	C34	SM661127104	SM.1uF
A33	205750000	C16L8L	C35	SM661207103	SM.01uF
A34	205750000	C16L8L	C36	SM661127104	SM.1uF
A35	SM208277770	SMTL7770-5	C37	SM661127104	SM.1uF
A36	SM207178541	SM74HCT541	C38	SM661127104	SM.1uF
A37	SM207178541	SM74HCT541	C39	SM661207103	SM.01uF
A38	EPROM	EPROM	C40	SM661207103	SM.01uF
A39	SM-PSRAM	SM-PSRAM	C41	SM666377226	SM22uF-15V
A40	SM207878245	SM74HCT245	C42	SM661127104	SM.1uF
A41	SM205219265	SM6264-10	C43	SM666377226	SM22uF-15V
A42	SM205219265	SM6264-10	C44	SM661127104	SM.1uF
A43	MNX401	MNX401	C45	SM661127104	SM.1uF
B1	312590070	BAT-2.4V-50	C46	SM661127104	SM.1uF
C1	SM661127104	SM.1uF	C47	SM661127104	SM.1uF

PART: F9300-1-2 DESC: PROCESSOR CARD with 2Mb RAM for 9361

Location	Part Number	Description	Location	Part Number	Description
C48	SM661207102	SM.001uF	R16	SM652101511	SM510S
C49	SM666377226	SM22uF-15V	R17	SM652101103	SM10KS
C50	SM661127104	SM.1uF	R18	SM652101102	SM1KS
C51	SM661127104	SM.1uF	R20	SM652101103	SM10KS
C52	SM661127104	SM.1uF	R21	SM652101220	SM22S
C53	SM661127104	SM.1uF	R22	SM652101220	SM22S
C54	SM661127104	SM.1uF	R23	SM652101220	SM22S
C55	SM661127104	SM.1uF	R24	SM652101220	SM22S
C56	SM661127104	SM.1uF	R25	SM652101220	SM22S
C57	SM661255101	SM100pF	R27	SM652101103	SM10KS
C60	SM661127104	SM.1uF	R28	SM652101220	SM22S
C61	SM666327225	SM2.2uF-20V	R29	SM652101220	SM22S
C63	SM666377226	SM22uF-15V	R30	SM652101220	SM22S
C64	SM661255101	SM100pF	R31	SM652101220	SM22S
CR1	SM253032823	HSMS2823	R32	SM652101152	SM1.5KS
CR2	SM256232013	SLM-13V	R33	SM652101152	SM1.5KS
CR3	SM236030099	BAV99	R34	SM652101220	SM22S
DR1	NULL	DRILL3_2	R35	SM652101220	SM22S
DR2	NULL	DRILL3_2	R36	SM652101220	SM22S
DR3	NULL	DRILL3_2	R37	SM652101220	SM22S
DR4	NULL	DRILL3_2	R38	SM652101220	SM22S
DR5	NULL	DRILL3_2	R39	SM652101220	SM22S
J1	455410096	3x32-RA-M-SC	R40	SM652101103	SM10KS
J2	455420096	3x32-RA-F-SC	R41	SM652101152	SM1.5KS
J3	404500068	2x34-RA-CGS	R42	SM652101221	SM220S
J4	454511020	2x10-RA-M-RE	R43	SM652101102	SM1KS
J5	454511040	2x20-RA-M-RE	R44	SM652101220	SM22S
J6	454511014	2x7-RA-M-RE	R46	SM652101103	SM10KS
J7	454340002	2x1-ST-M-NW	R47	SM652101103	SM10KS
L1	SM301502001	SMBEAD1206	R48	SM652101103	SM10KS
Q1	SM270330848	BC848C	R49	SM652101104	SM100KS
Q2	SM270330848	BC848C	R50	SM652101104	SM100KS
Q3	SM280171005	MTD10N05E	R51	SM652101220	SM22S
R3	SM652101101	SM100S	R52	SM652101104	SM100KS
R4	SM652101221	SM220S	R53	SM652101220	SM22S
R5	SM652101103	SM10KS	R54	SM652101152	SM1.5KS
R6	SM652101102	SM1KS	R55	SM652101332	SM3.3KS
R8	SM652101154	SM150KS	RN1	190042103	10K-SIPC
R9	SM652101106	SM10MS	RN2	190642103	10K-6SIPC
R10	SM652101101	SM100S	RN3	190042103	10K-SC
R11	SM652101101	SM100S	RN4	190042103	10K-SC
R12	SM652101101	SM100S	RN5	190042103	10K-SC
R13	SM652101103	SM10KS	RN6	190842102	1K-8SC
R14	SM652101220	SM22S	RN7	190042103	10K-SIPC
R15	SM652101102	SM1KS	RN8	190042103	10K-SIPC

PART: F9300-1-2 DESC: PROCESSOR CARD with 2Mb RAM for 9361

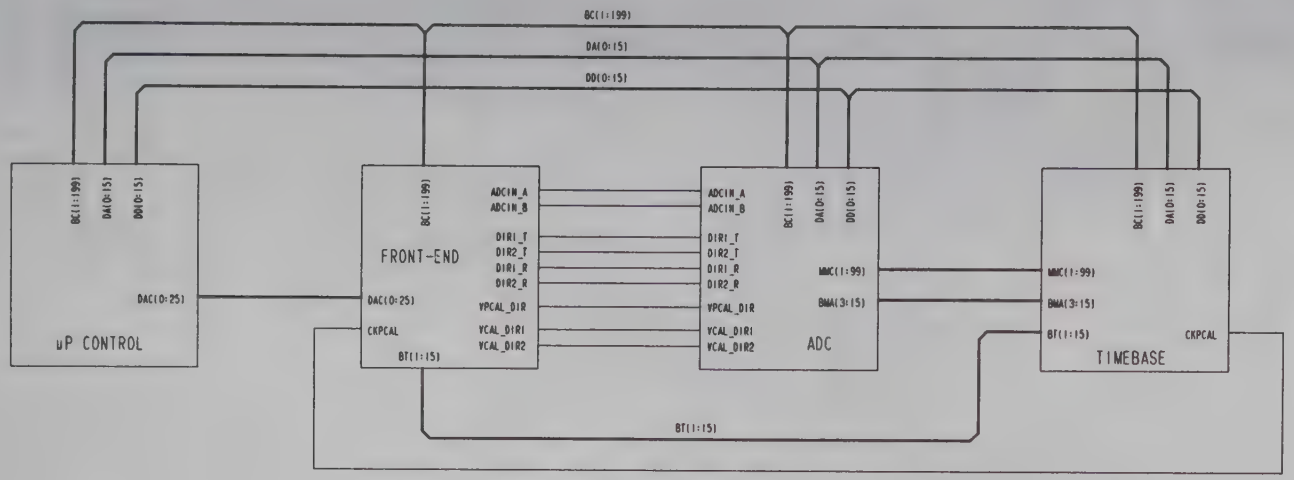
Location	Part Number	Description
RN9	190042103	10K-SIPC
RN10	190042103	10K-SIPC
S1	SM654101000	SM0S-2P
S2	SM654101000	SM0S-2P
S3	SM654101000	SM0S-2P
S4	SM654101000	SM0S-2P
S5	SM654101000	SM0S-2P
S6	SM654101000	SM0S-2P
S7	SM654101000	SM0S-2P
S9	SM654101000	SM0S-2P
S10	SM654101000	SM0S-2P
S11	SM654101000	SM0S-2P
S12	SM654101000	SM0S-2P
T1	NULL	OPEN-SHORT
Y1	SM310300406	SM32.768KHz
Y2	309380016	16.000MHZ
Y3	SM311248000	SMOSC48MHz

PART: F9300-1-2 DESC: PROCESSOR CARD with 2Mb RAM for 9361

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
190042103	RESISTOR NETWORK 10 K	8
190642103	RESISTOR NETWORK 10 K	1
190842102	RES NETWORK 1 K	1
205370004	IC CMOS UV EPROM 32K X 8 27C	1
205370020 or 205371040	IC UV EPROM CMOS 2MBIT or 4MBIT	4 or 2
205750000	IC AND-OR GATE ARRAY 16V8	9
253010835	DIODE HOT CARRIER HP2835	1
309380016	CRYSTAL OSC (PROGR) 16 MHZ	1
312590070	BATTERY LITHIUM 3V 70MAH	1
400331020	SOCKET IC ST DIP-20	1
400360028	SOCKET IC ST DIP-28	1
400360032	SOCKET IC ST DIP-32	4
404500068	CONN BD TO BD 68 POS	1
454340002	HDR MALE PIN TO WW 02	1
454511014	HDR SOLD TAIL MALE/14/RT	1
454511020	HDR SOLD TAIL MALE 20	1
454511040	HDR SOLD TAIL MALE/40/RT	1
455410096	CONN RT ANGLE MALE 96 S-CLIP	1
550130108	SCREW CYL HD M3X8	2
552130101	NUT HEX M3	2
719300103	PC BD PREASS'Y 9300-1 F	1

PART: F9300-1-2 DESC: PROCESSOR CARD with 2Mb RAM for 9361

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
MDS410	IC RSDP GATE ARRAY MDS410	1
MNX401	ICMIN MAX GATEARR. MNX401	1
SM200178032	IC 2-IN OR HCT32	2
SM200276068	IC RTC SERIAL 68HC68T1	1
SM201186574	IC OCTAL D-TYP FLOP 74AC574	1
SM205219256	IC 32K X 8 SRAM MS62256	1
SM205219264	IC 8K X 8 SRAM 70 NSEC 6264	3
SM205290512	IC 512K X 8 PSRAM HM658512	4
SM205701070	IC 128KX8 STAT RAM 70 NS	1
SM207178541	IC BUFFER/LINE DR HCT541	6
SM207260475	IC RAMDAC 256W 50MHZ BT475	1
SM207668020	IC 32-BIT U-PROC 68020	1
SM207668881	IC CO-PROCESSOR 68881	1
SM207878245	IC BUS TRANSCVR HCT 245	2
SM208277770	IC DUAL PWR SUPPLY SUP 7770-5	1
SM208470358	IC DUAL OP AMP 358D	1
SM236030099	DIODE SO-PKG BAV99	1
SM253032823	DIODE SCHOTTKY 2823	1
SM256232013	DIODE LIGHT EMITTING RED	1
SM270330848	TRANSISTOR NPN BC848C	2
SM280171005	TRANS POWER MOSFET MTD10N05E	1
SM301502001	BEAD (FERRITE CHIP)	1
SM310300406	CRYSTAL 32768HZ	1
SM311248000	CRYSTAL OSCILLATOR 48MHZ	1
SM652101101	RES CHIP (E24) 1% 100 OHM	4
SM652101102	RES CHIP (E24) 1% 1 K	4
SM652101103	RES CHIP (E24) 1% 10 K	9
SM652101104	RES CHIP (E24) 1% 100 K	3
SM652101106	RES CHIP (E24) 1% 10 MEG	1
SM652101152	RES CHIP (E24) 1% 1.5 K	4
SM652101154	RES CHIP (E24) 1% 150 K	1
SM652101220	RES CHIP (E24) 1% 22 OHMS	19
SM652101221	RES CHIP (E24) 1% 220 OHM	2
SM652101332	RES CHIP (E24) 1% 3.3 K	1
SM652101511	RES CHIP (E24) 1% 510 OHM	1
SM654101000	CHIP JUMPER ZERO OHMS	11
SM661127104	CAP CERA CHIP 20% .1 UF	40
SM661207102	CAP CERA CHIP 10% .001UF	1
SM661207103	CAP CERA CHIP 20% .01UF (0805)	9
SM661255101	CAP CERA CHIP 5% 100 PF	2
SM661255180	CAP CERA CHIP 5% 18PF	2
SM666217106	CAP MOLD TANT CHIP 10 UF	1
SM666327225	CAP MOLD TANT CHIP 2.2 UF	1
SM666377226	CAP MOLD TANT CHIP 22 UF	4

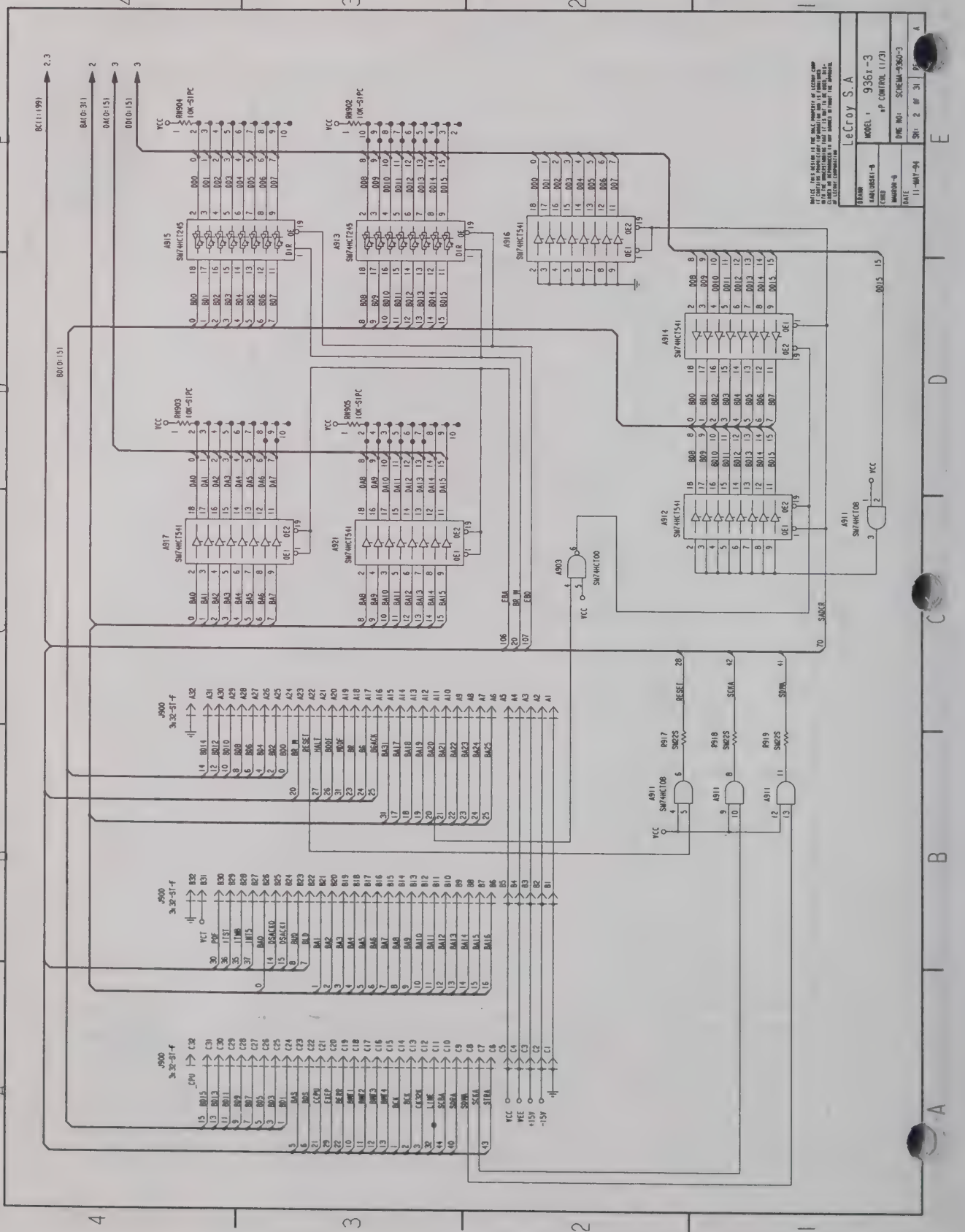


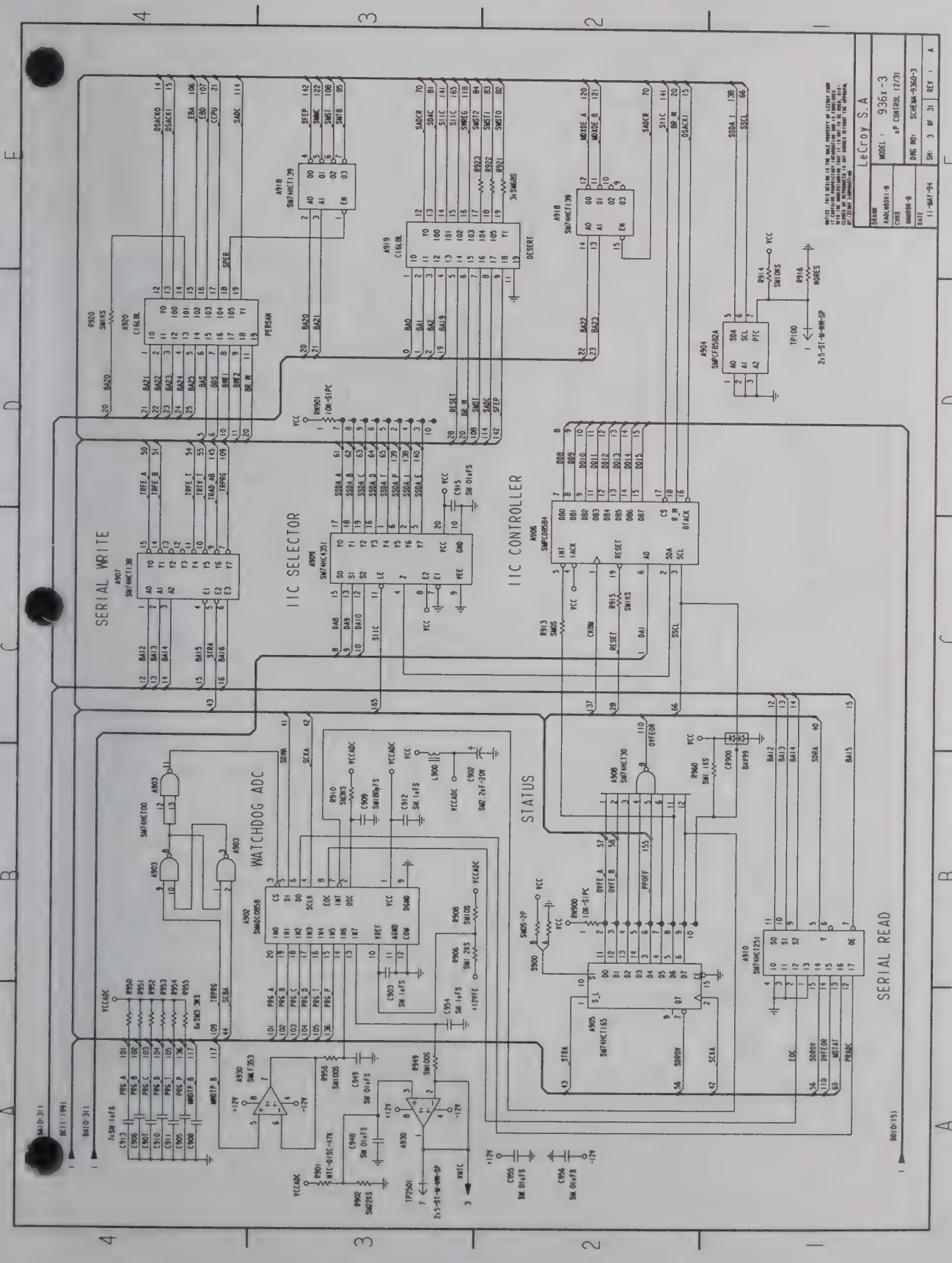
UNMOUNTED COMPONENT :		9360	9361
DIRECT IN :		none	A & B
SMDG403	(FE SHEET1)	none	A107-A108
BFR92A	(ADC SHEET1)	none	Q204
SM1KS		none	R265-R269
SM200S		none	R258
SM120S		none	R252
SM68S		none	R227
SM51S		none	R310

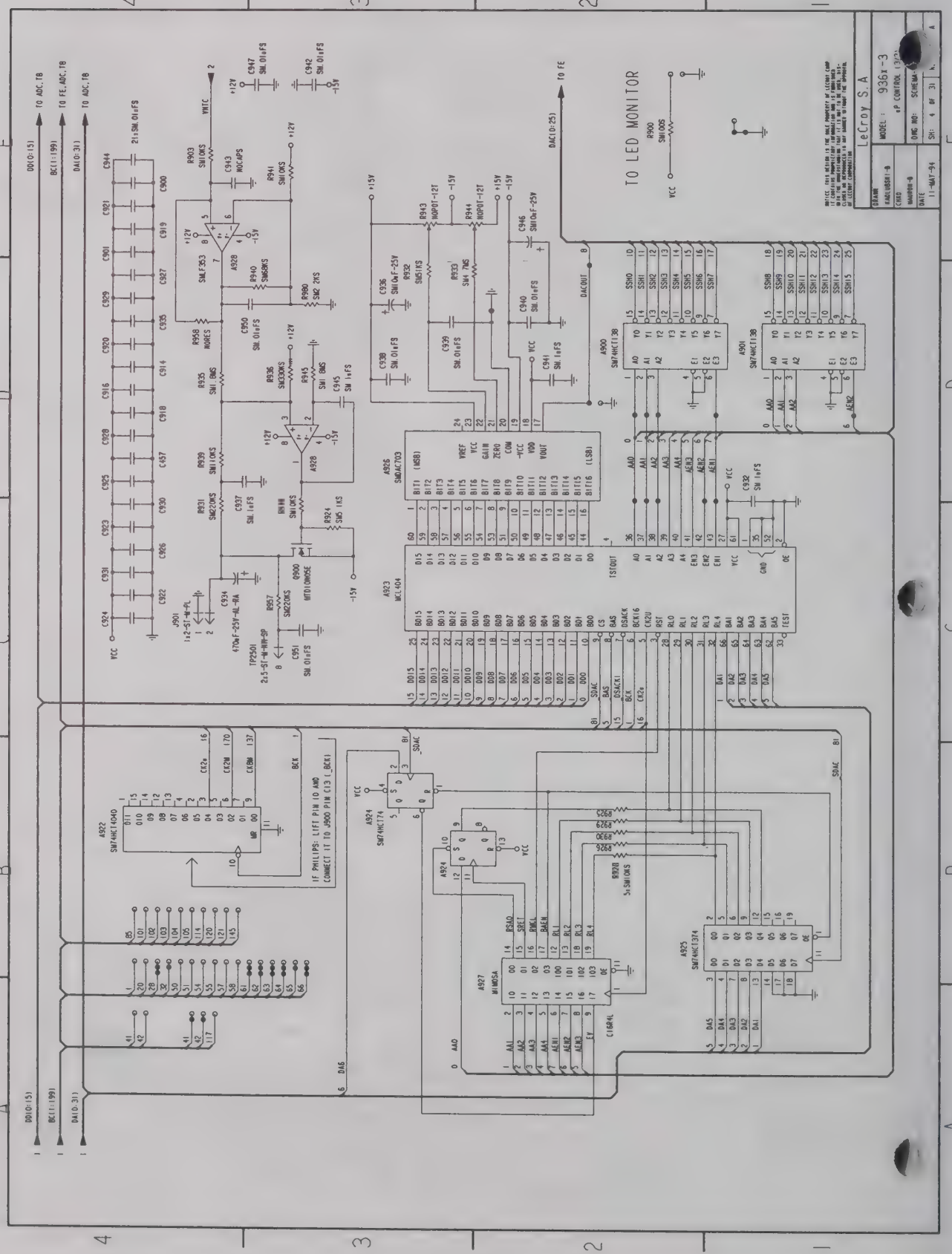
ADDITIONAL COMPONENT ON EXISTING PADS			9360	9361
SM05	SM654101000	(FE SHEET1)	none	R121-R122
SM75S	SM652101750	(ADC SHEET1)	none	R3048-R4048

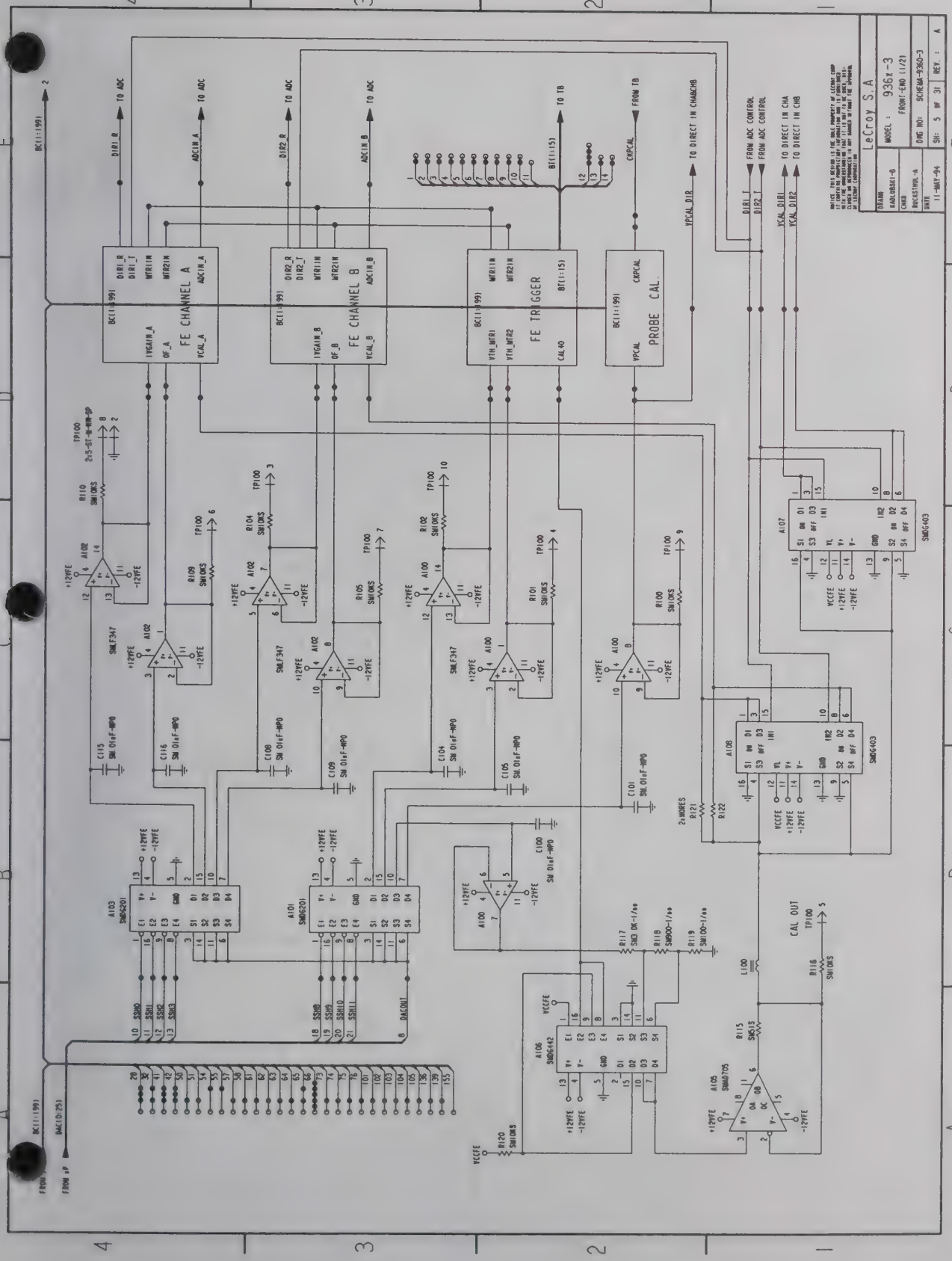
NOTICE - THIS DESIGN IS THE SOLE PROPERTY OF LECROY CORP IT CONTAINS PROPRIETARY INFORMATION AND IS FURNISHED WITH THE UNDERSTANDING THAT IT IS NOT TO BE USED, DISCLOSED OR REPRODUCED IN ANY MANNER WITHOUT THE APPROVAL OF LECROY CORPORATION.

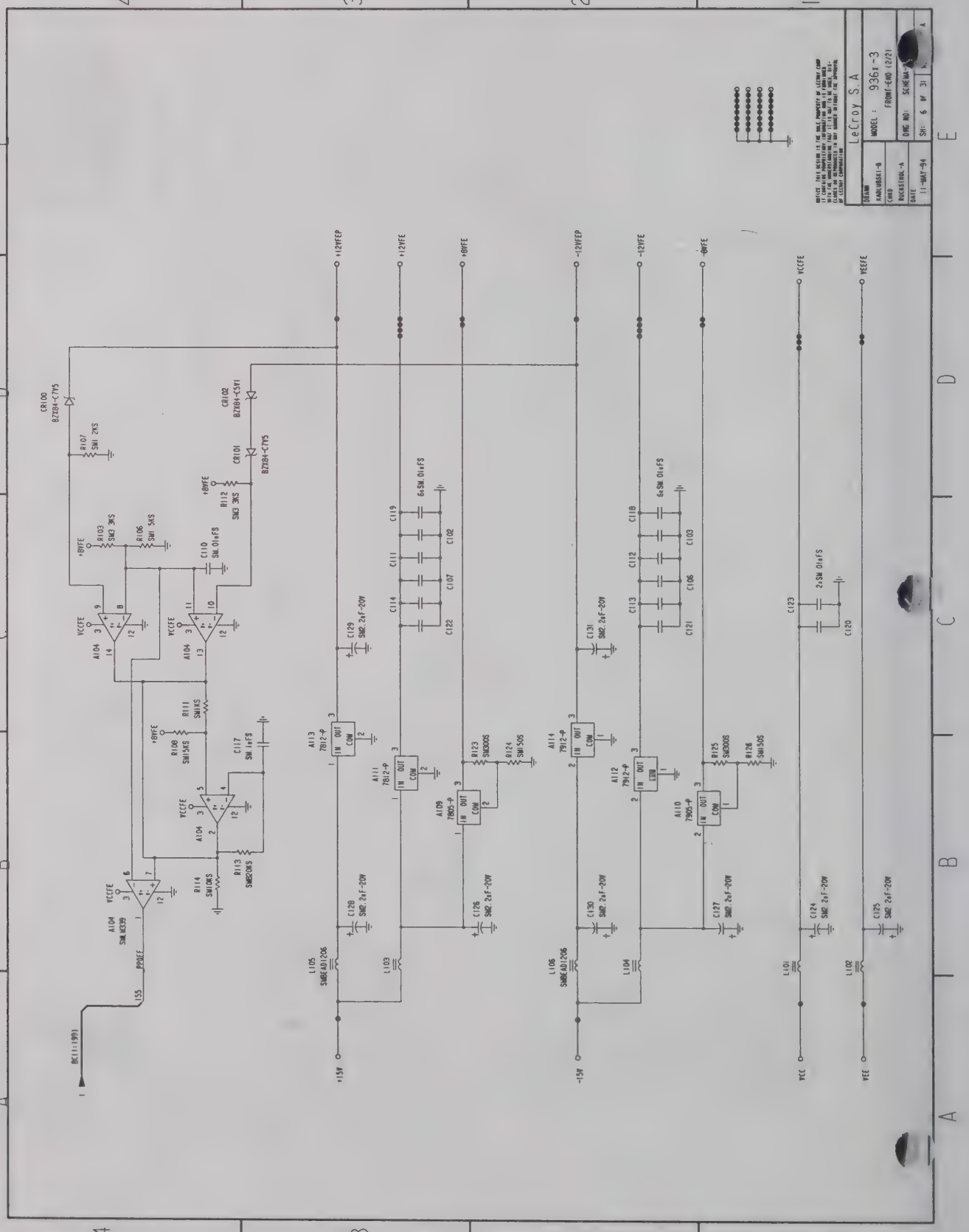
LeCroy S.A	
DRAWN: KADLUBSKI-B	MODEL : 936x-3 TOP LEVEL (1/1)
CHKD: GENTSCH-R	DWG NO: SCHEMA-9360-3
DATE: 11-MAY-94	SH: 1 OF 31 REV : A

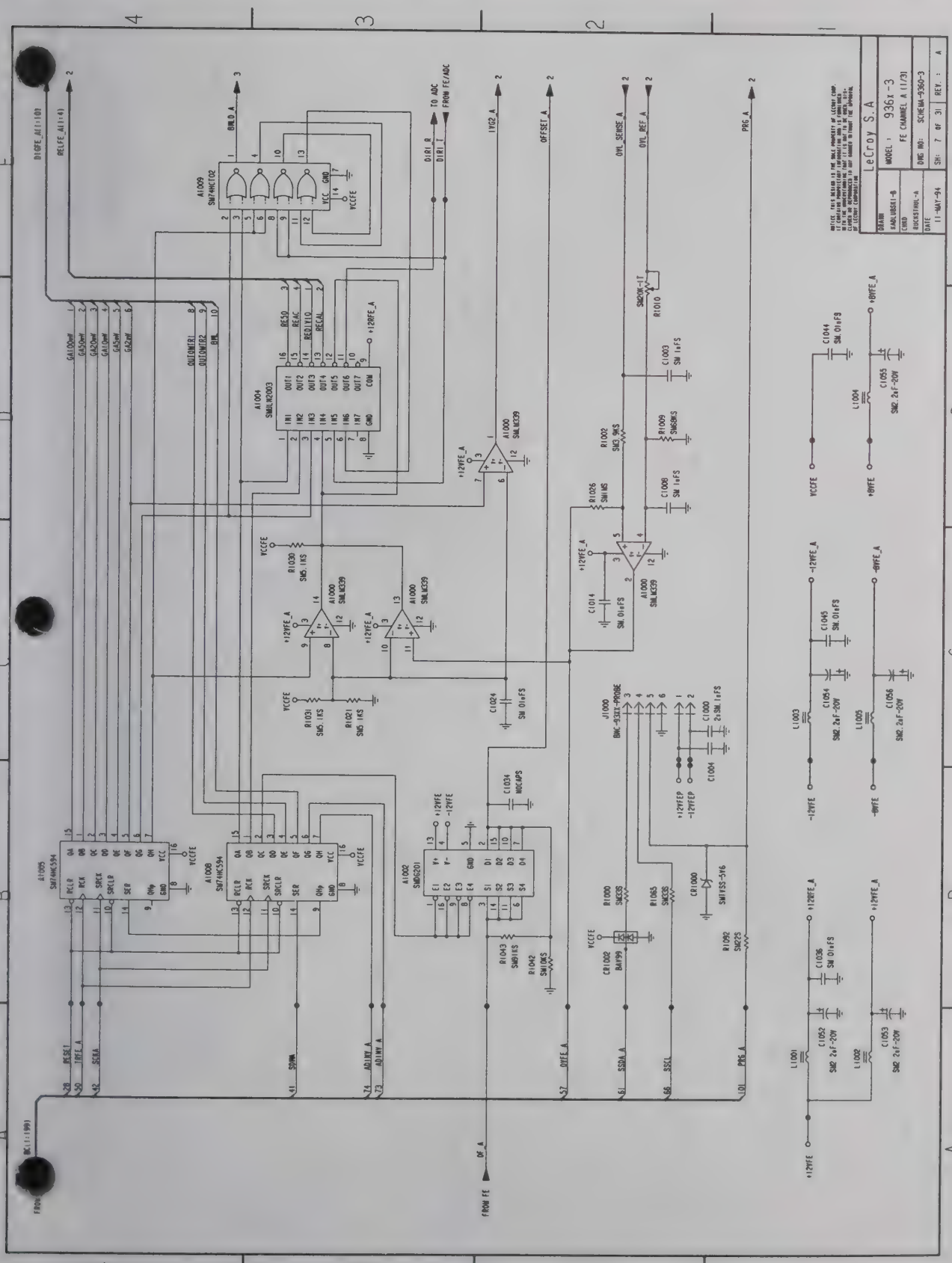

LeCroy S.A
MODEL : 936x-3
µP CONTROL (1/3)
DWG NO: SCHEMA-9360-3
DATE 11-MAY-94
SH: 2 OF 31
A915 SN74HCT245
A913 SN74HCT245
A916 SN74HCT541
A914 SN74HCT541
A917 SN74HCT541
A921 SN74HCT541
A912 SN74HCT541
A911 SN74HCT08
A903 SN74HCT00
J900 3x32-ST-F
RN904 10K-SIPC
RN902 10K-SIPC
RN903 10K-SIPC
RN905 10K-SIPC
VCC
BC(1:199)
BA(0:31)
DA(0:15)
DD(0:15)
BD(0:15)

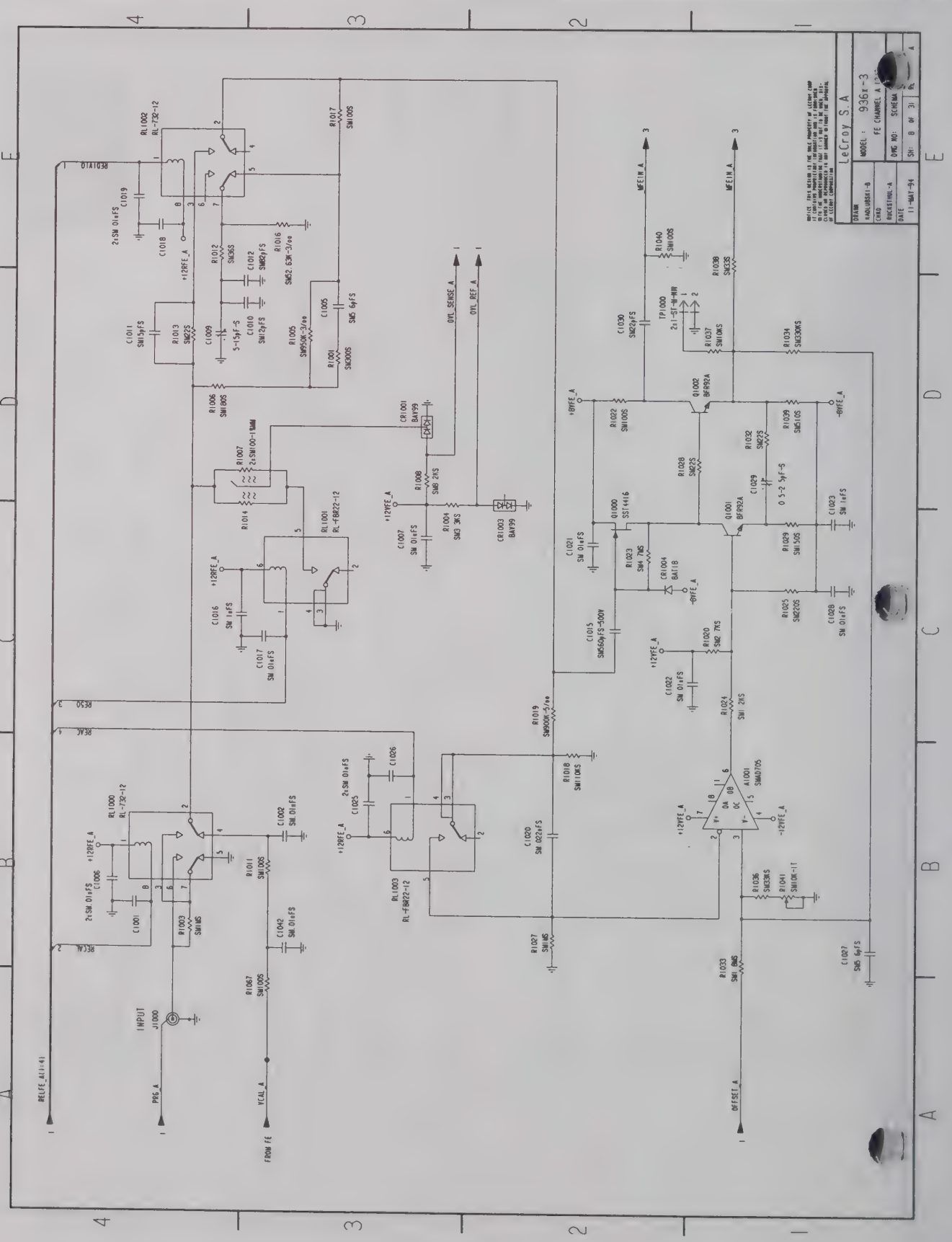

SERIAL WRITE
IIC SELECTOR
IIC CONTROLLER
WATCHDOG ADC
STATUS
SERIAL READ
LeCroy S.A
MODEL : 936x -3
uP CONTROL 12/31
DWG NO: SCHEMA-9360-3
SH: 3 OF 31
REV : A
DRAWN
CHKD
DATE
11-MAY-94

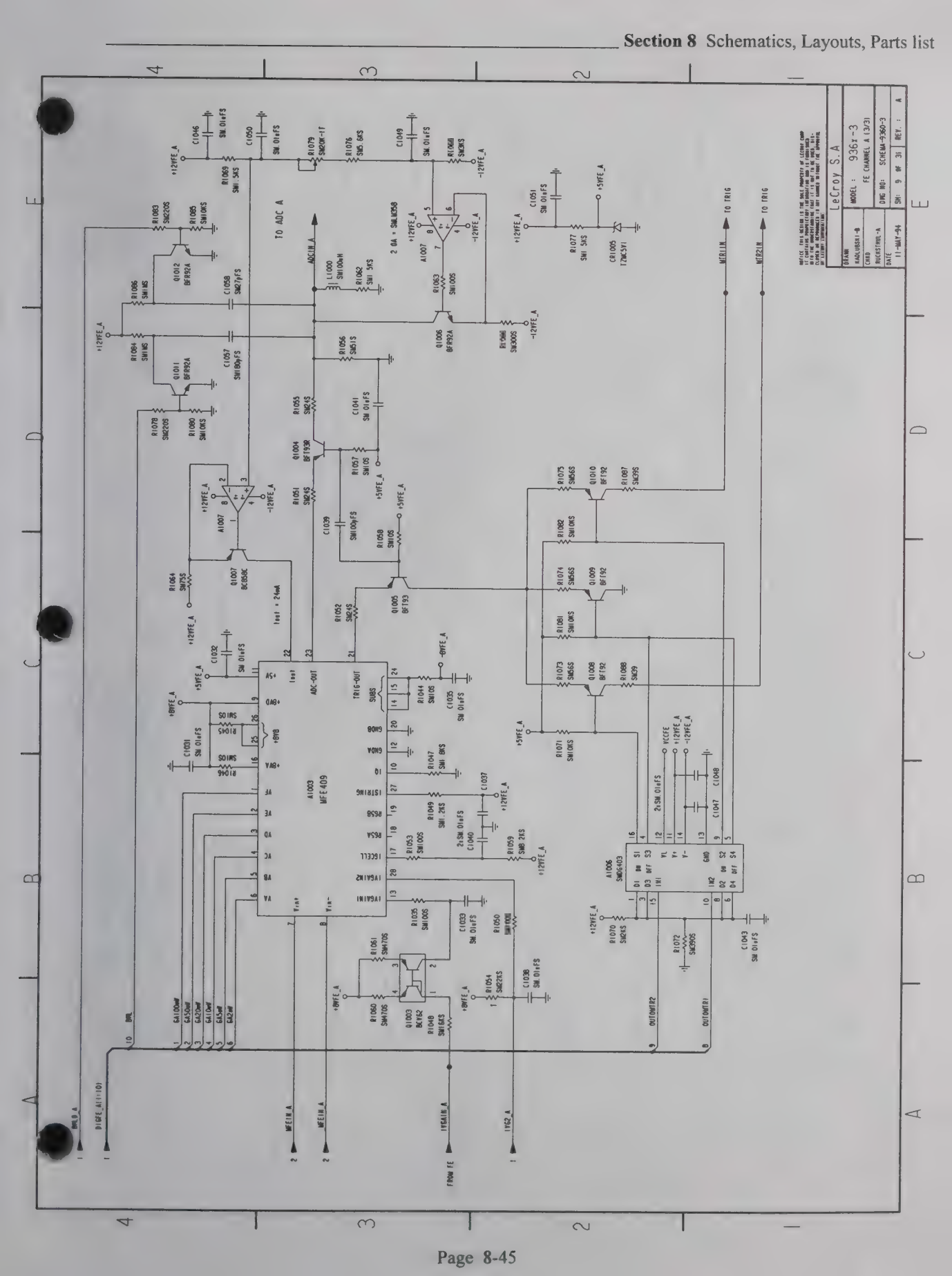

LeCroy S.A
MODEL : 936x-3
TO LED MONITOR
A923 MCL404
A926 SMDAC703
A900 SM74HCT138
A901 SM74HCT138
A922 SM74HCT4040
A924 SM74HCT74
A925 SM74HCT374
A927 MIMOSA
IF PHILIPS: LIFT PIN 10 AND CONNECT IT TO J900 PIN C13 (_BCK)

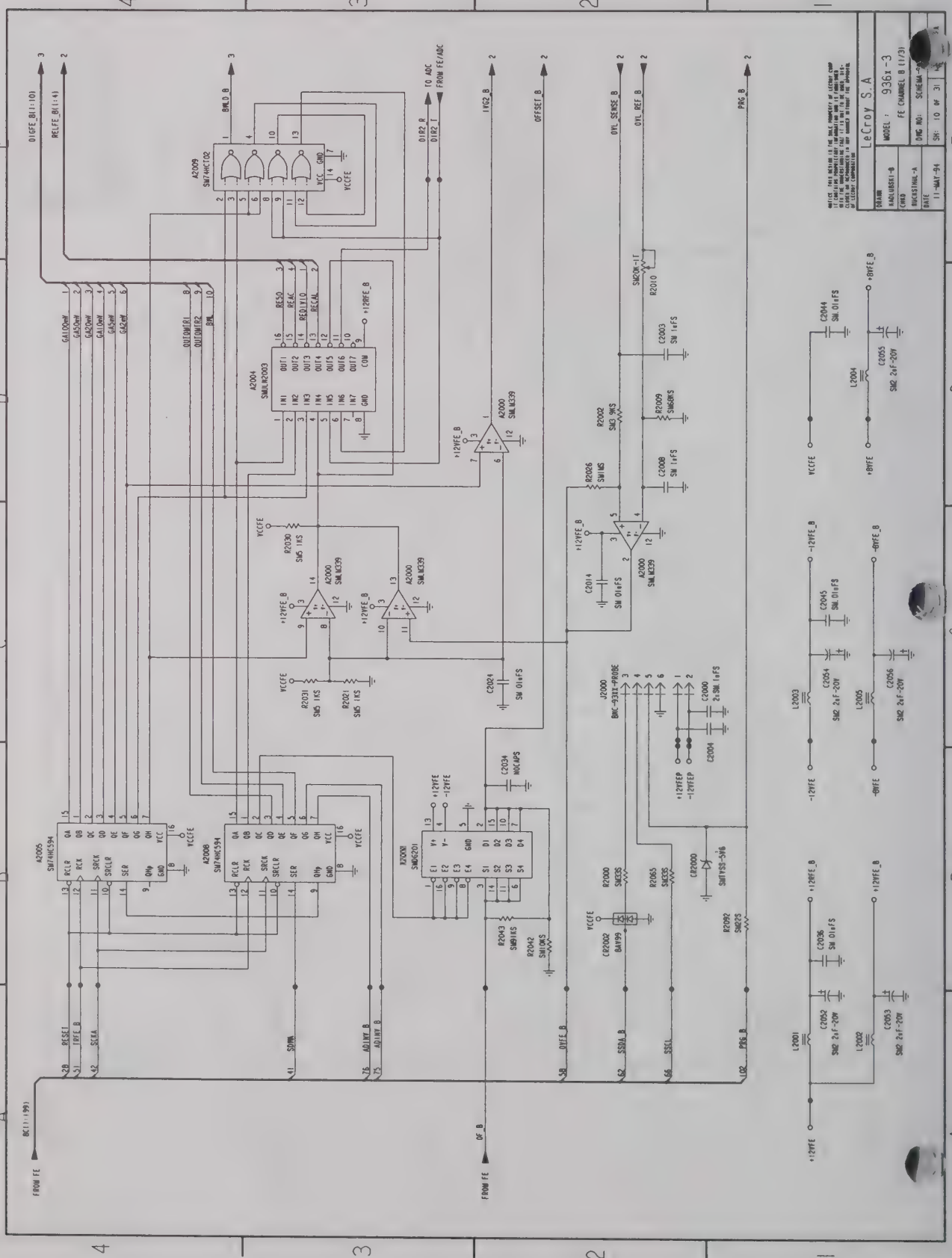

FE CHANNEL A
FE CHANNEL B
FE TRIGGER
PROBE CAL.
TO ADC
TO TB
TO DIRECT IN CHA
TO DIRECT IN CHB
FROM ADC CONTROL
CAL OUT
LeCroy S.A.
MODEL : 936x-3
FRONT-END (1/2)
SCHEMA-9360-3
11-MAY-94

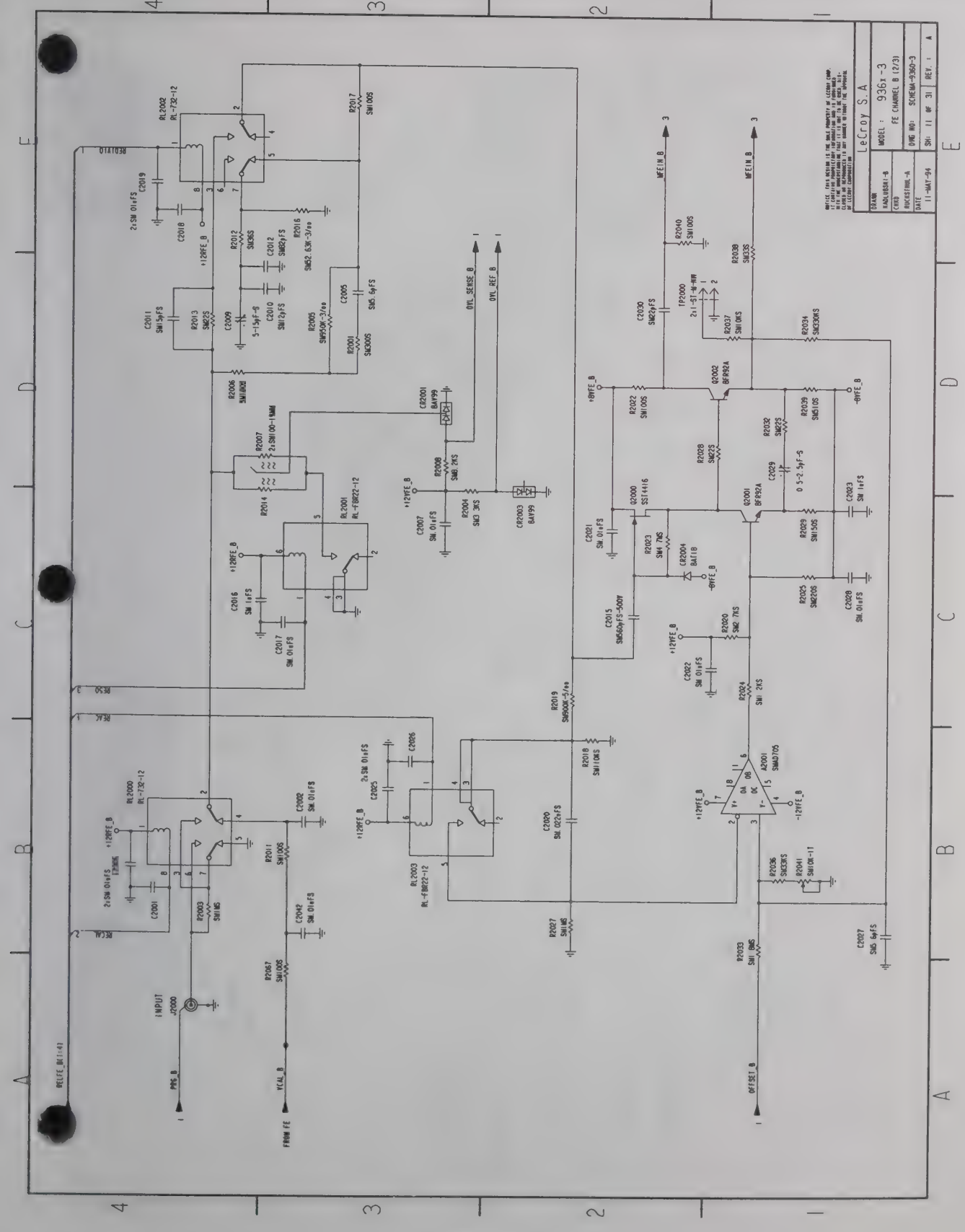

LeCroy S.A
MODEL : 936x-3
FRONT-END 12/21
DRAWN
KABLUBSKI-B
CHKD
BUCKSTEIN-A
DATE
11-MAY-94
DWG NO: SCHEMA
SH: 6 OF 31
+12VFEP
+12VFE
+8VFE
-12VFEP
-12VFE
-8VFE
VCCFE
VEEFE
+15V
-15V
VCC
VEE
BC(1:199)

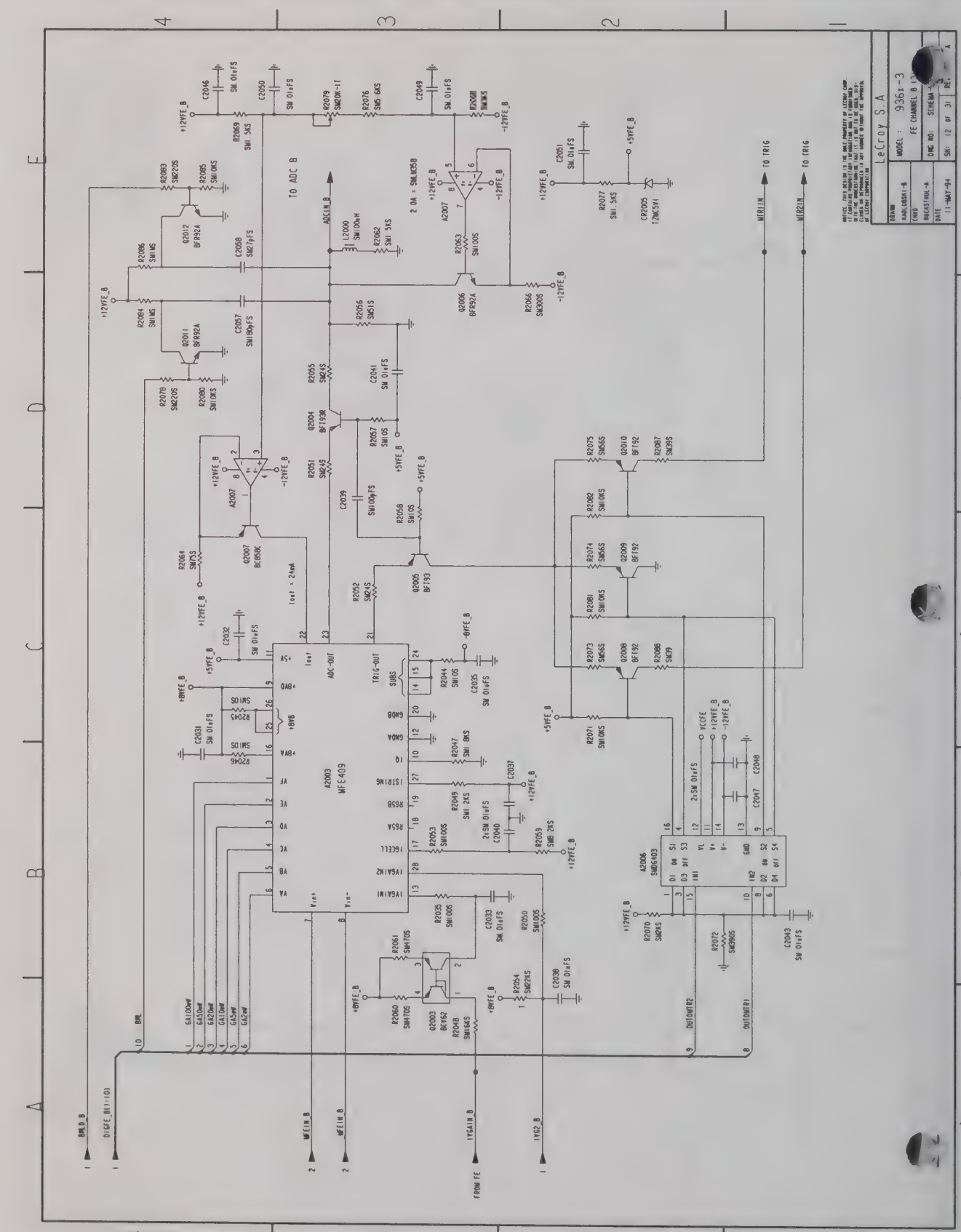

LeCroy S.A
MODEL : 936x-3
FE CHANNEL A (1/3)
DWG NO: SCHEMA-9360-3
SH: 7 OF 31
REV. : A
DATE 11-MAY-94
A1009 SM74HCT02
A1004 SMULN2003
A1000 SMLM339
A1005 SM74HC594
A1008 SM74HC594
A1002 SMDG201
J1000 BNC-93XX-PROBE
CR1002 BAY99
CR1000 SMTVSS-5V6
TO ADC FROM FE/ADC
FROM FE

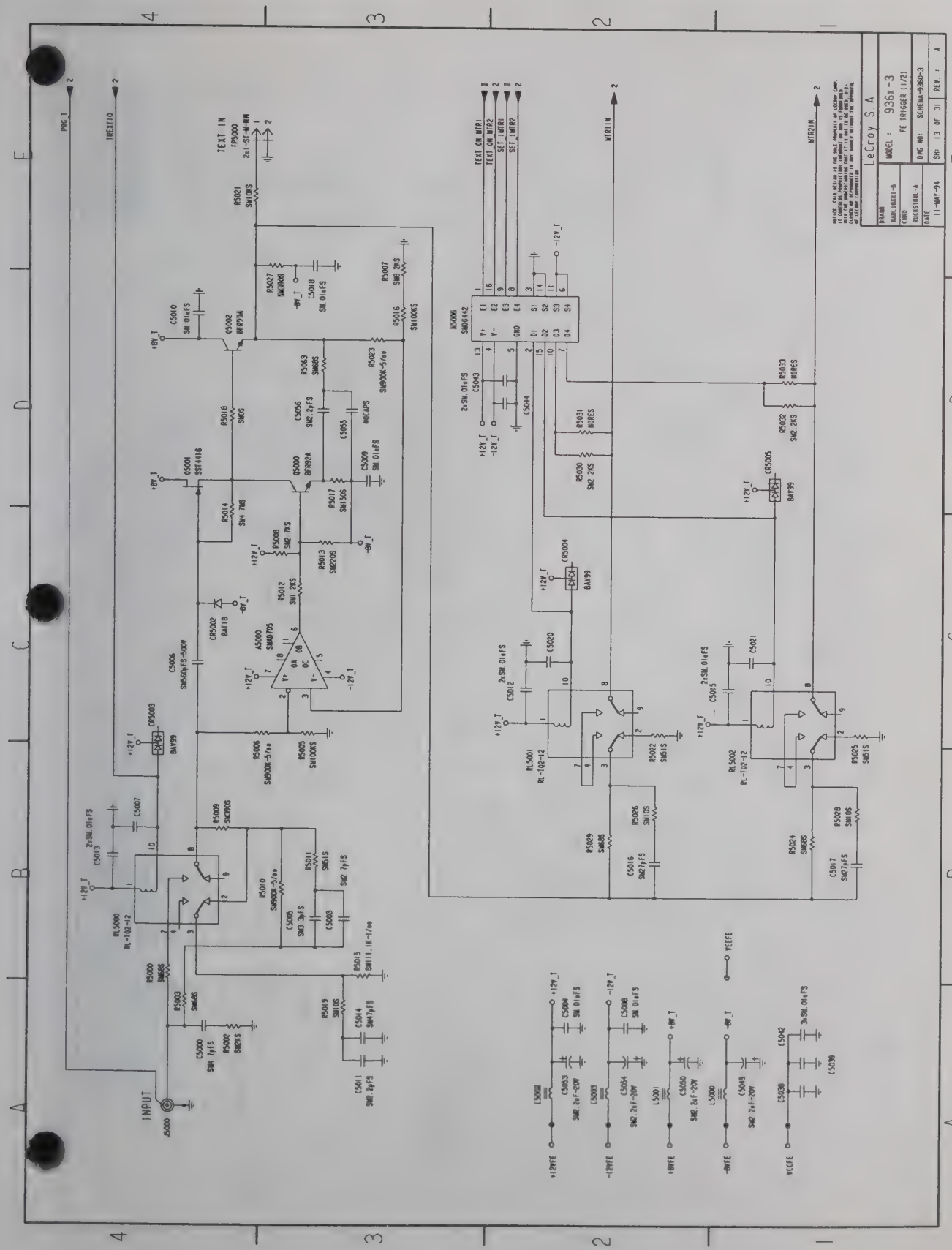

LeCroy S.A
MODEL : 936x-3
FE CHANNEL A
DRAWN
CHKD
DATE
DWG NO: SCHEMA
SH: 8 OF 31
INPUT J1000
OVL_SENSE_A
OVL_REF_A
OFFSET_A
PRG_A
VCAL_A
FROM FE
RELFE_A(1:4)

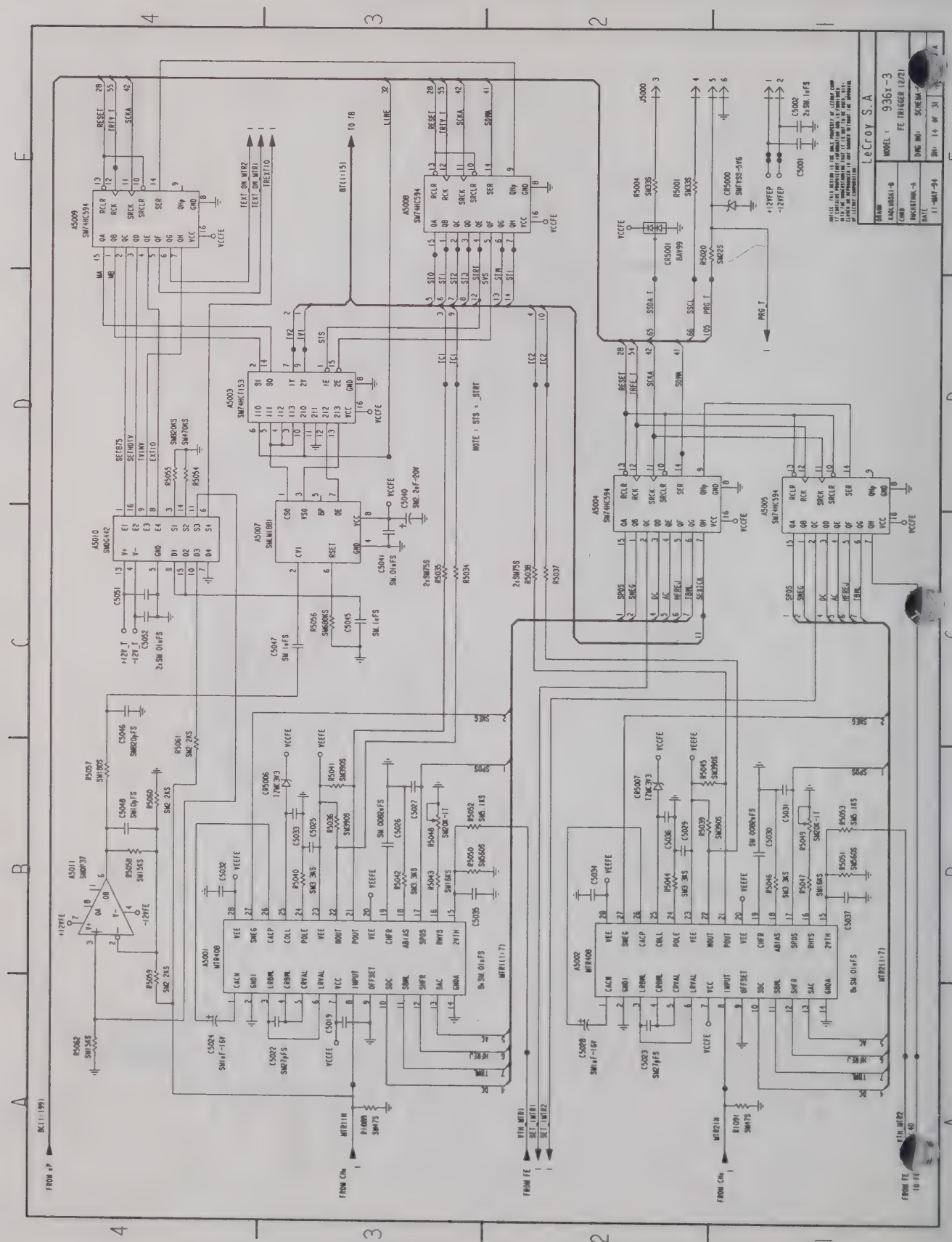

LeCroy S.A
MODEL : 936Z-3
FE CHANNEL A (3/3)
SCHEM-9360-3
11-MAY-94
TO ADC A
TO TRIG
A1003 MFE409
A1006 SM3X403
A1007
Q1003 BCX62
Q1005 BF193
Q1006 BF892A
Q1007 BC858C
Q1008 BF192
Q1009 BF192
Q1010 BF192
Q1011 BF892A
Q1012 BF892A
Q1004 BF939B
CR1005 TZMC5V1
ADC-OUT
TRIG-OUT
FROM FE

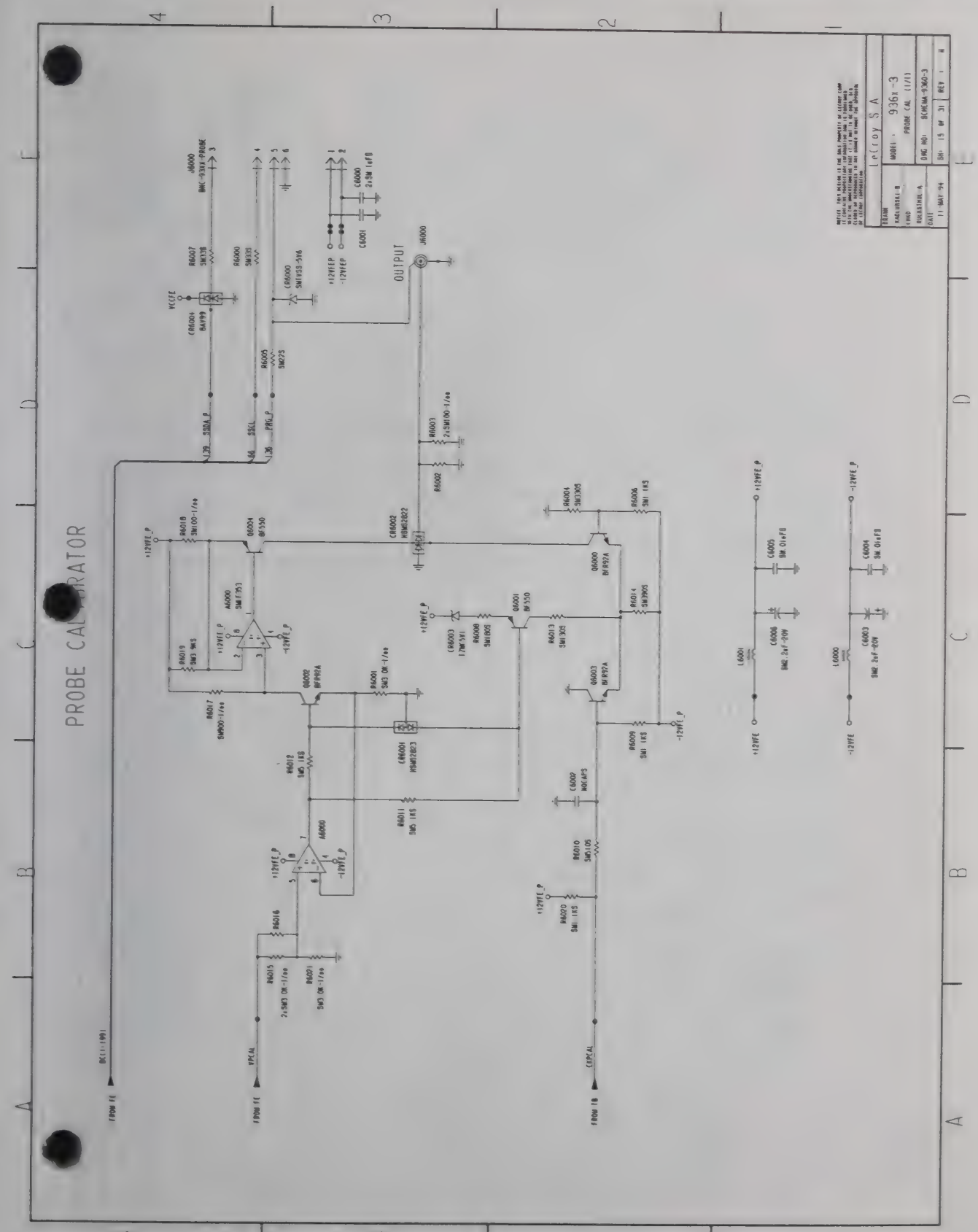


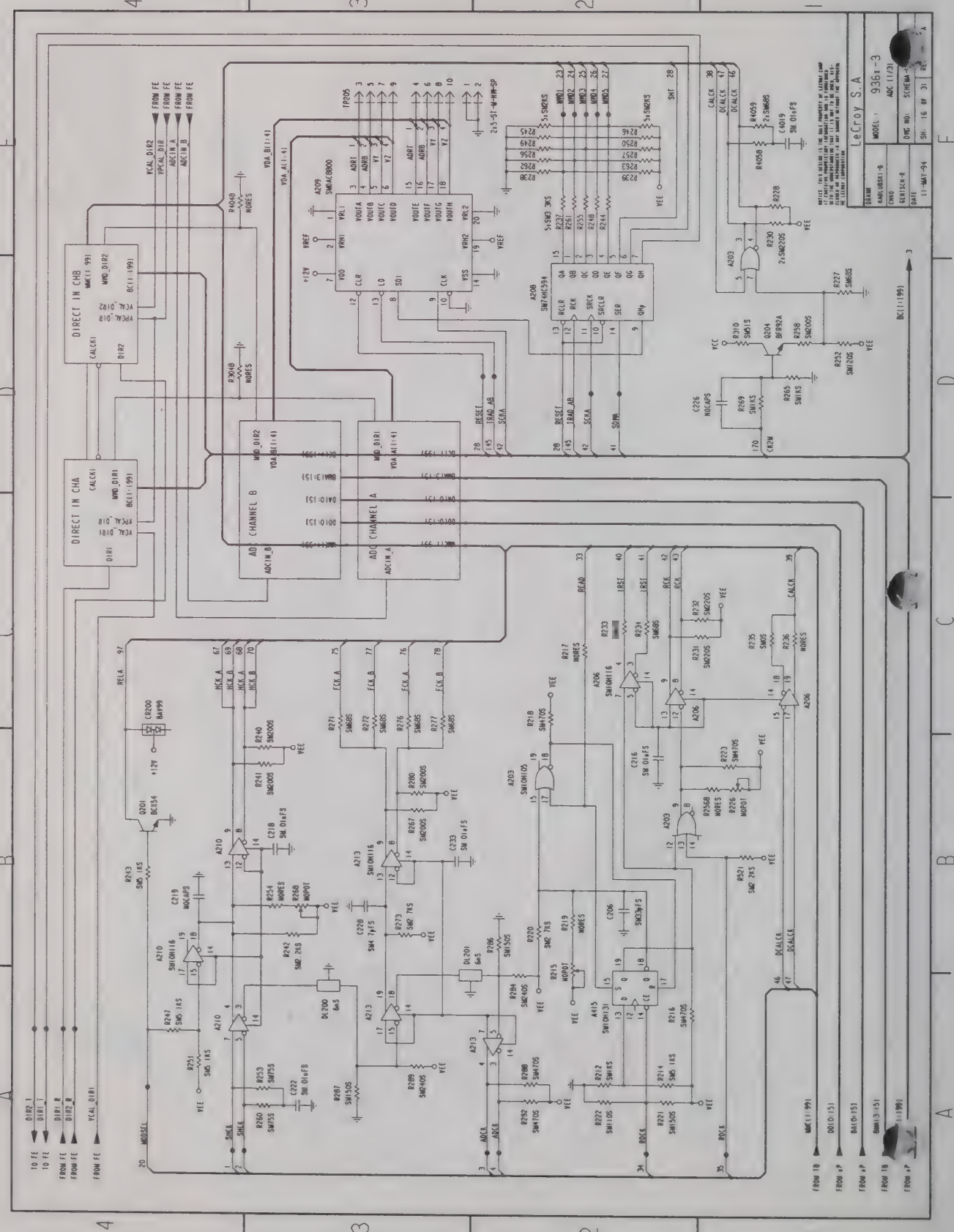

LeCroy S.A
MODEL : 936x-3
FE CHANNEL B (2/3)
DWG NO: SCHEMA-9360-3
SH: 11 OF 31
REV. : A
DATE 11-MAY-94
INPUT J2000
FROM FE
PRG_B
VCAL_B
OFFSET_B
OVL_SENSE_B
OVL_REF_B
MFEIN_B
RL2000 RL-732-12
RL2001 RL-FBR22-12
RL2002 RL-732-12
RL2003 RL-FBR22-12
A2001 SMAD705
Q2000 SST4416
Q2001 BFR92A
Q2002 BFR92A
CR2001 BAV99
CR2003 BAV99
CR2004 BAT18
TP2000 2x1-ST-M-NW
+12VFE_B
-12VFE_B
+8VFE_B
-8VFE_B
+12RFE_B
REDIVID
RESO
REAC
RECAL

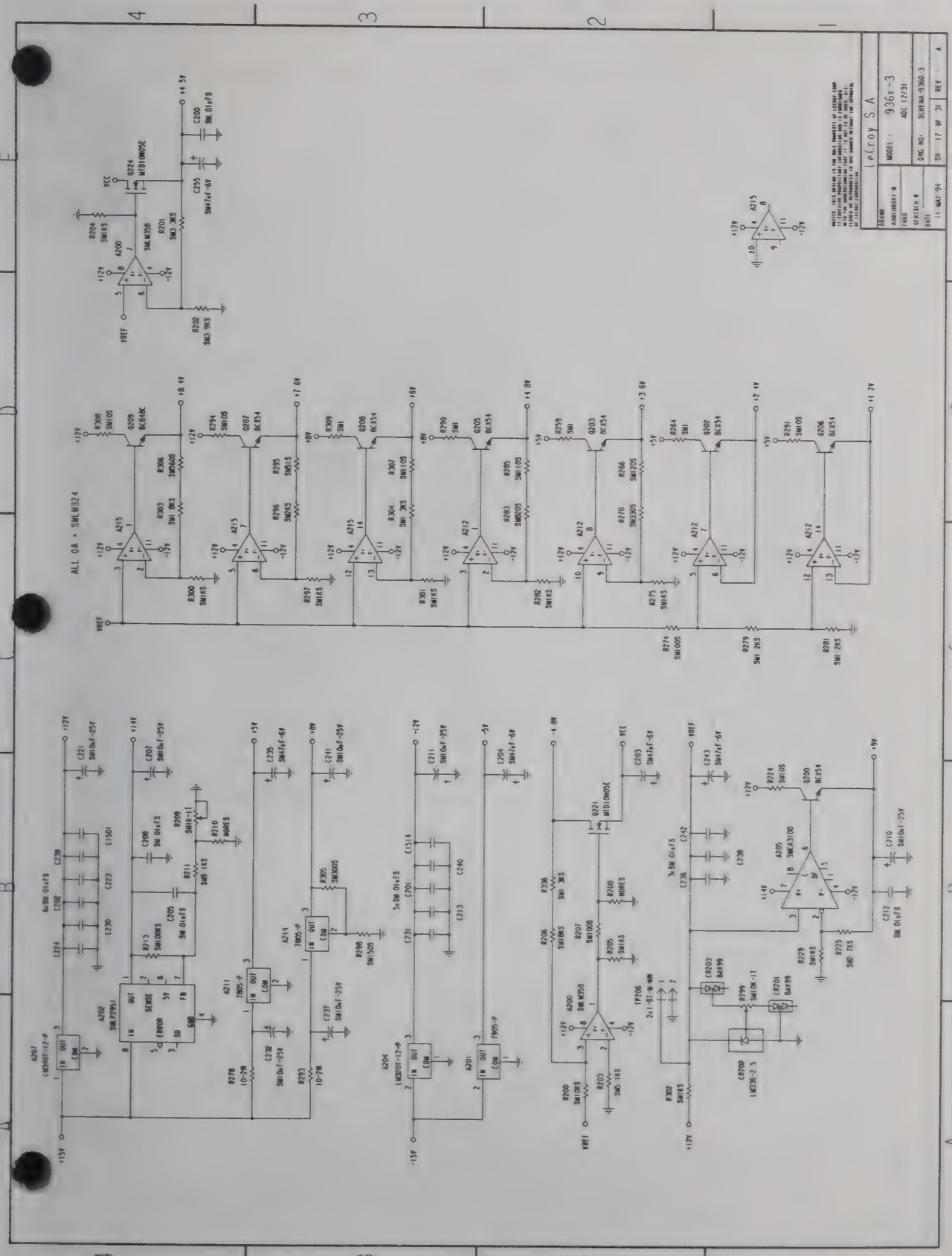

LeCroy S.A
MODEL : 936x-3
FE CHANNEL B (3
DRAWN
RADLOWSKI-A
CHKD
APPROVAL-A
DATE
11-MAY-94
DWG NO: SCHEMA-3
SH: 12 OF 31
REV: A
TO ADC B
TO TRIG
TO TRIG
FROM FE
A2003 WFE409
A2006 SN74HC153
A2007
Q2012 BFR92A
Q2011 BFR92A
Q2006 BFR92A
Q2004 BFT93W
Q2005 BFT93
Q2007 BC858C
Q2010 BFT92
Q2009 BFT92
Q2008 BFT92
Q2003 BCY52
L2000 SM100uH
CR2005 TZMC5V1
DIGFE_B[1:10]
BML_B
WFEIN_B
WFEIN_B
INTGAIN_B
INV2_B
OUTSHAR2
OUTSHAR1

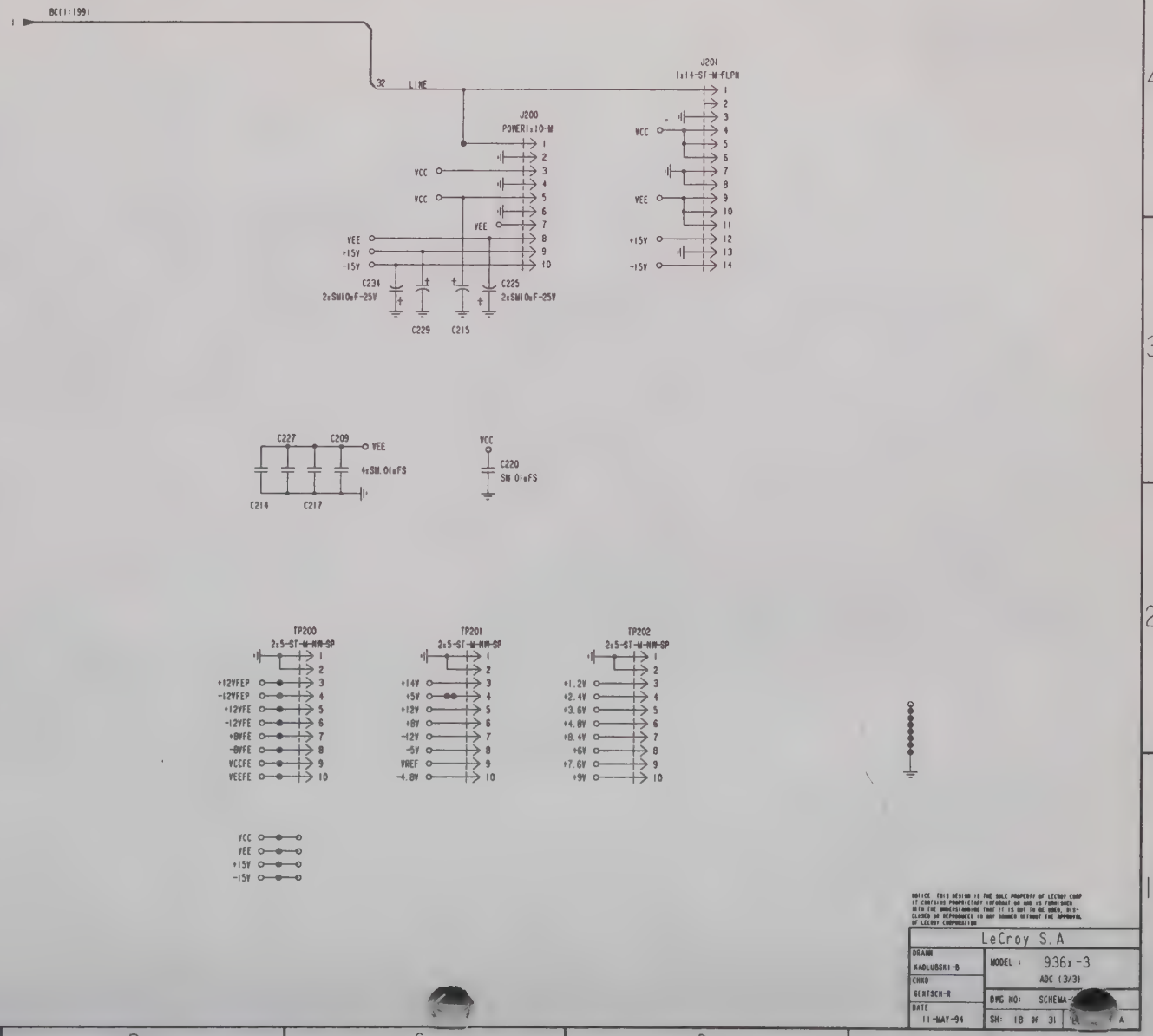

LeCroy S.A
MODEL : 936x-3
FE TRIGGER (1/2)
SCHEMA-9360-3
SH: 13 OF 31
REV : A
11-MAY-94
INPUT
TEXT IN
TEXT_ON_MTR1
TEXT_ON_MTR2
SEL_1MTR1
SEL_1MTR2
MTR1IN
MTR2IN
TRESTIO
PRG_I

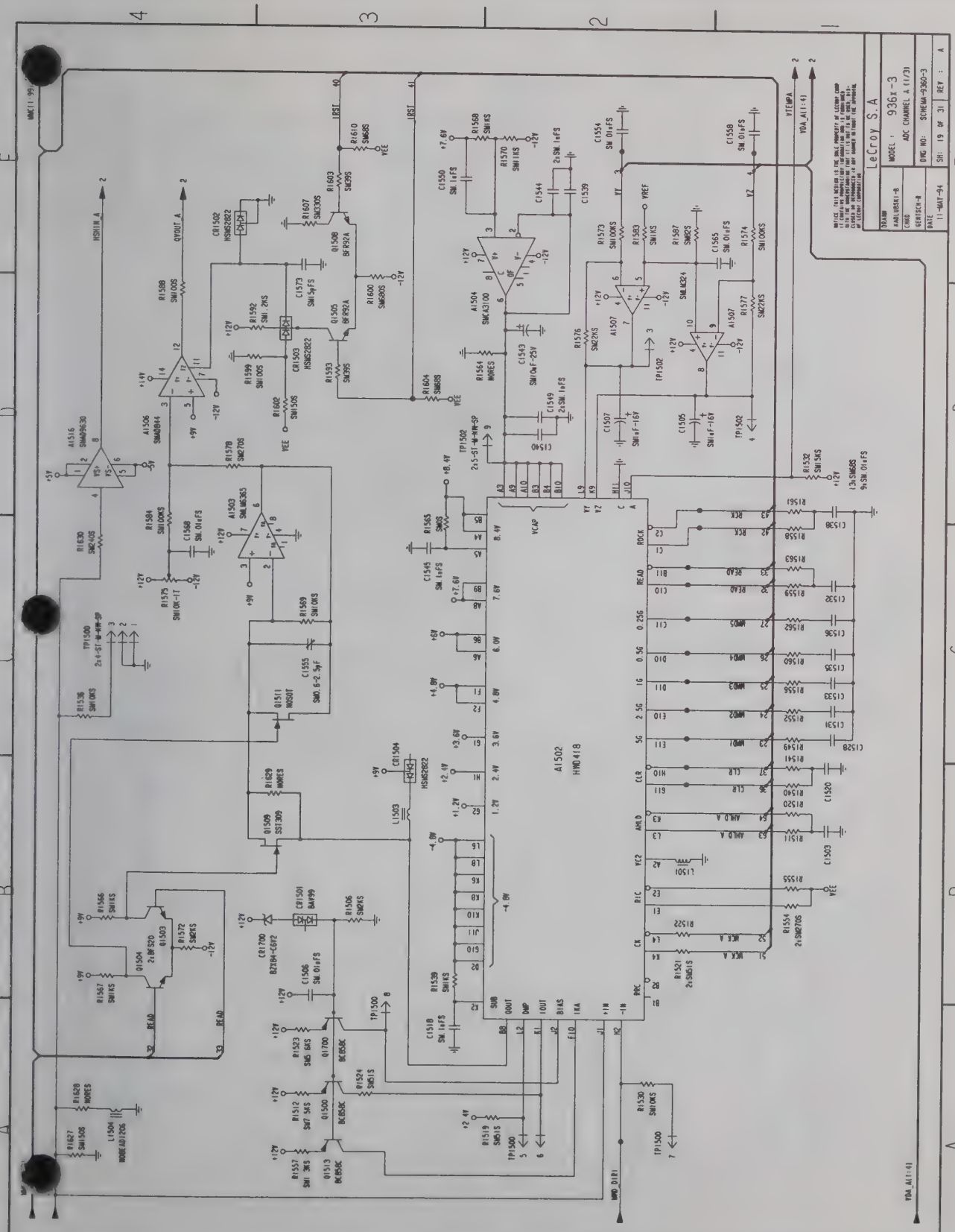

LeCroy S.A
MODEL : 936x-3
FE TRIGGER (2/2)
DWG NO: SCHEMA-
SH: 14 OF 31
DATE 11-MAY-94
NOTE : STS = _STRT

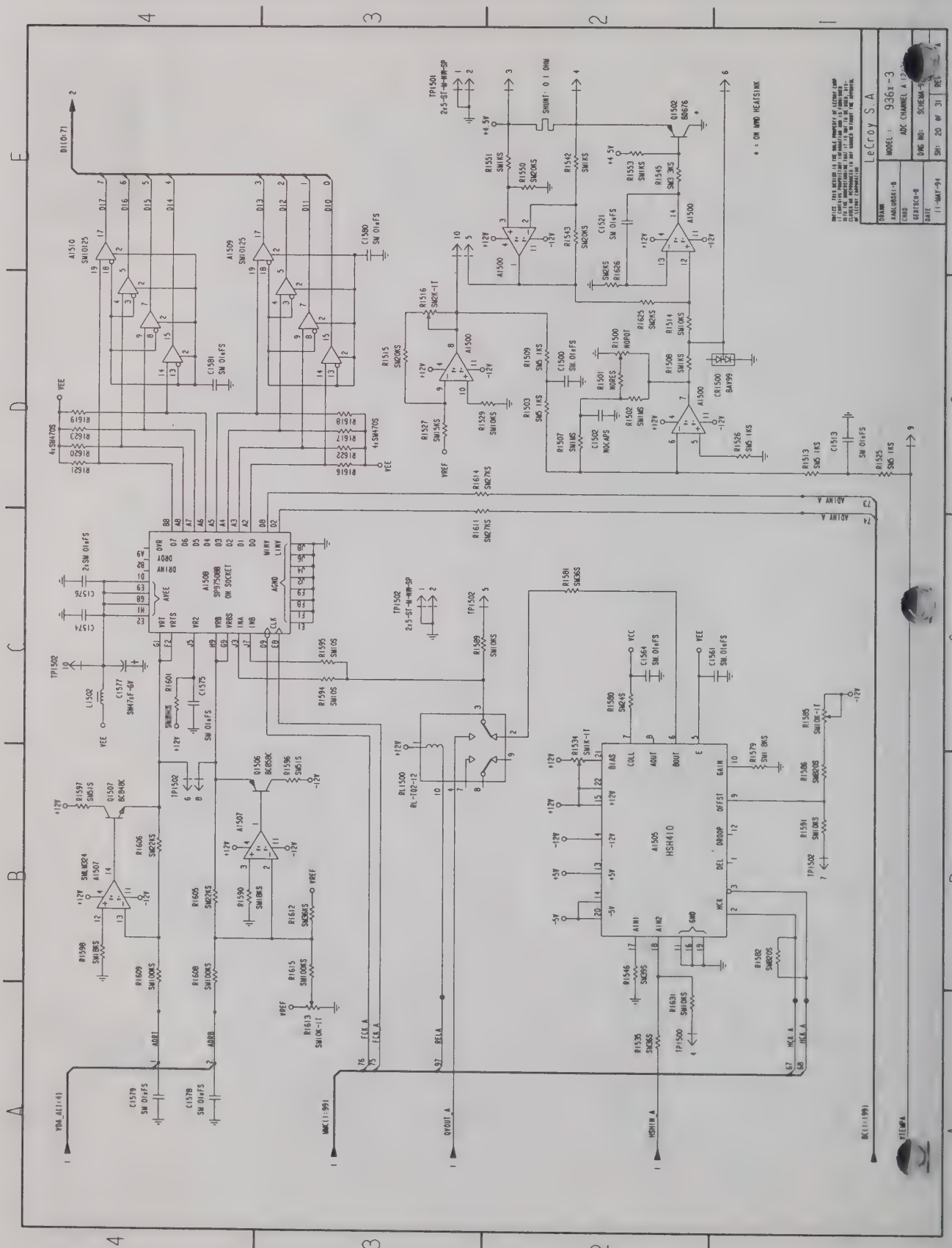

PROBE CALIBRATOR
OUTPUT
LeCroy S.A.
MODEL: 936x-3
PROBE CAL (1/1)
DWG NO: SCHEMA-9360-3
SH: 15 OF 31
REV: 1
11-MAY-94

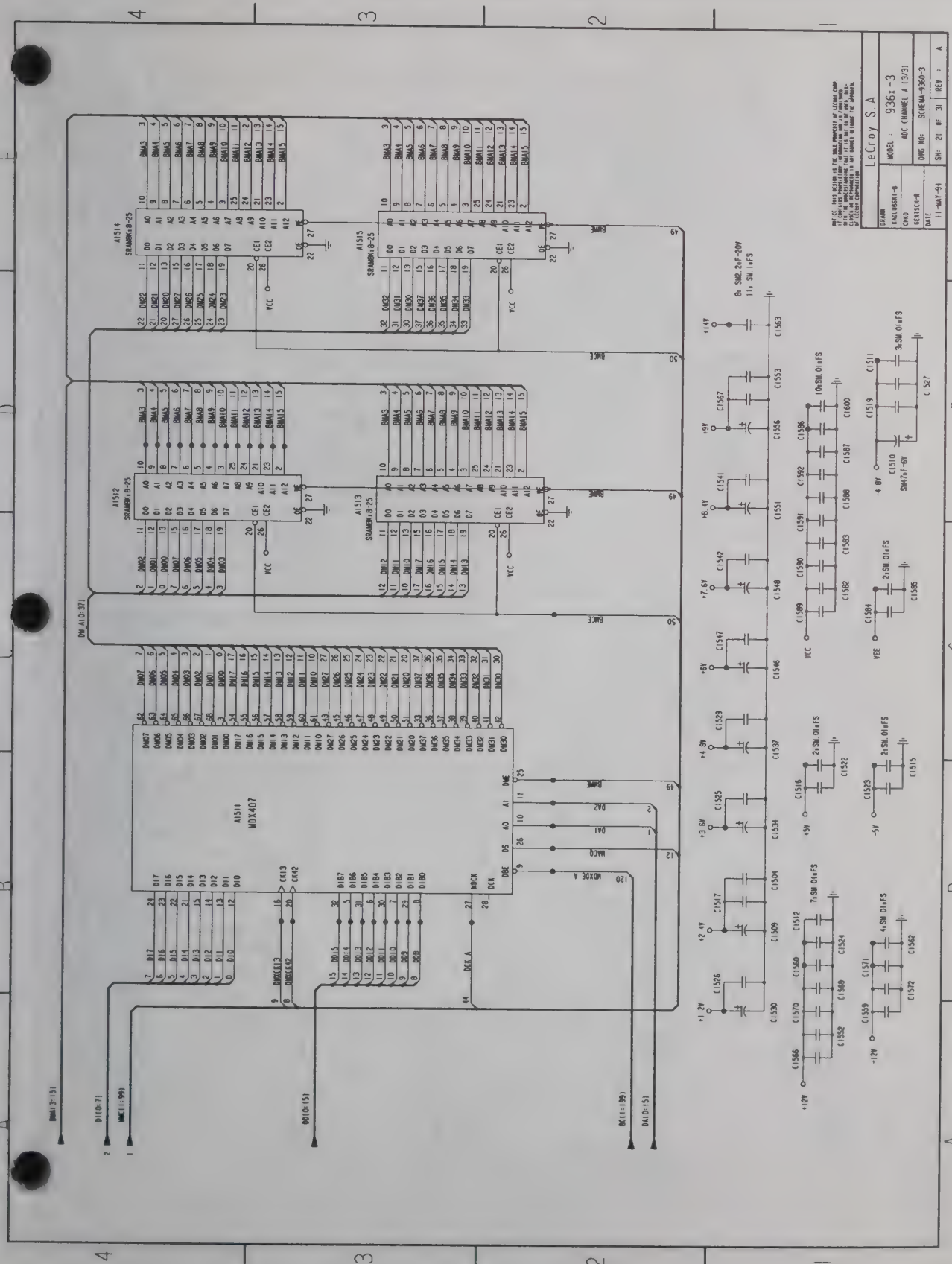


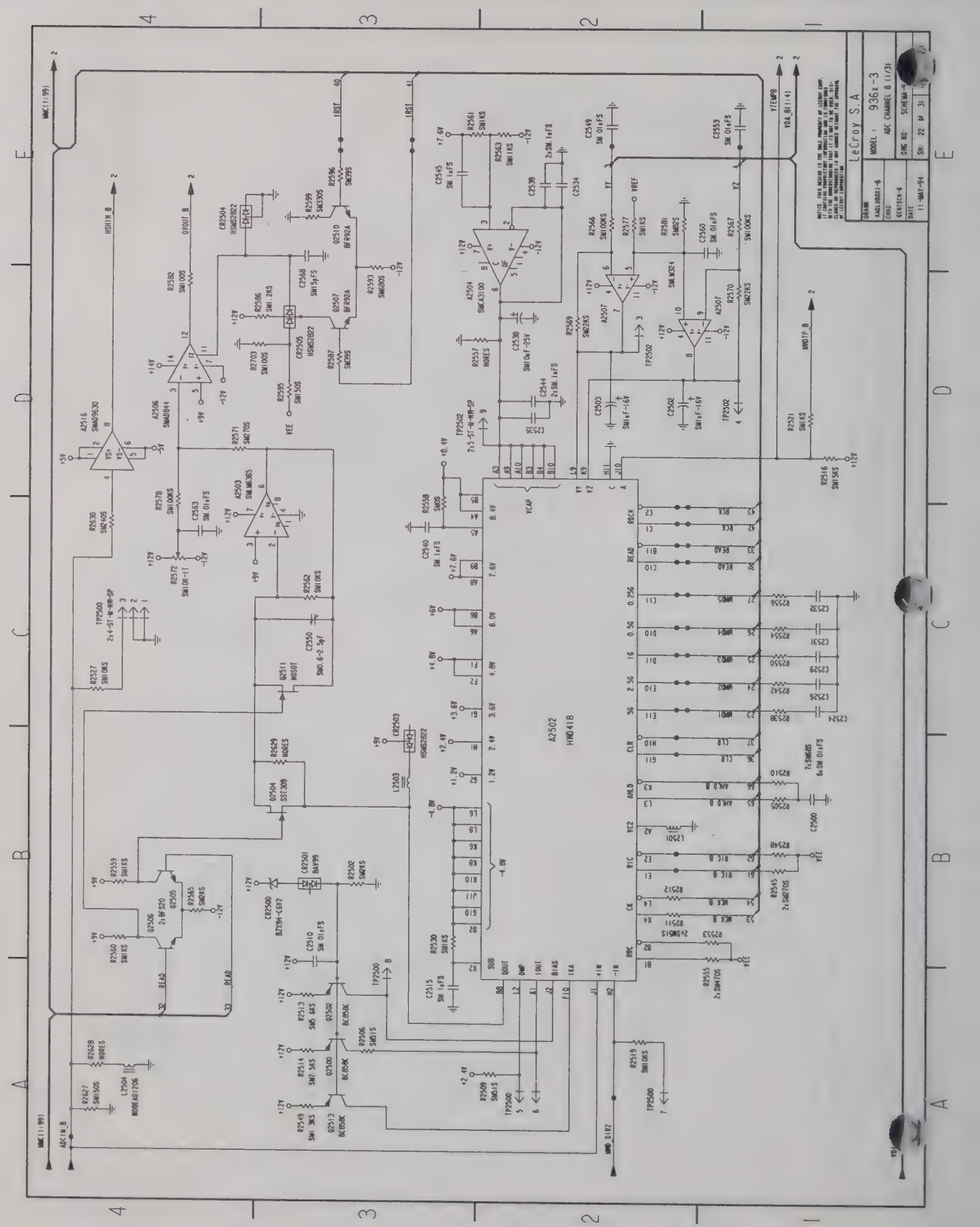


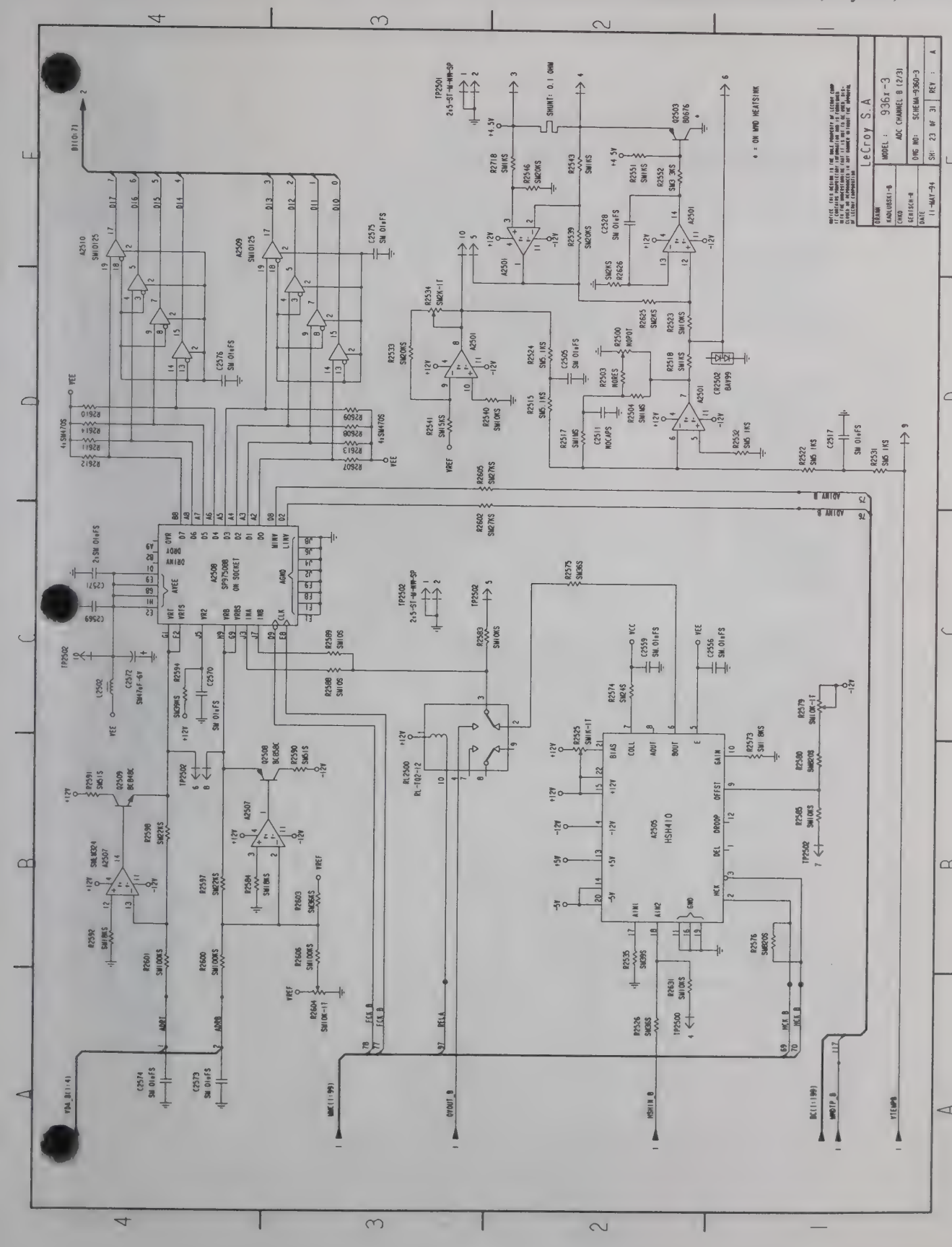

BC(1:199)
32 LINE
J200
POWER1x10-M
J201
1x14-ST-W-FLPN
VCC
VEE
+15V
-15V
C234
2xSMD0uF-25V
C225
2xSMD0uF-25V
C229
C215
C227
C209
C214
C217
4xSM.01uFS
C220
SM.01uFS
TP200
2x5-ST-W-NW-SP
+12VFEP
-12VFEP
+12VFE
-12VFE
+8VFE
-8VFE
VCCFE
VEEFE
TP201
2x5-ST-W-NW-SP
+14V
+5V
+12V
+8V
-12V
-5V
VREF
-4.8V
TP202
2x5-ST-W-NW-SP
+1.2V
+2.4V
+3.6V
+4.8V
+6V
+7.6V
+9V
LeCroy S.A
DRAWN
KADLUBSKI-B
CHKD
GERTSCH-R
DATE
11-MAY-94
MODEL : 936x-3
ADC (3/31)
DWG NO: SCHEMA-2
SH: 18 OF 31

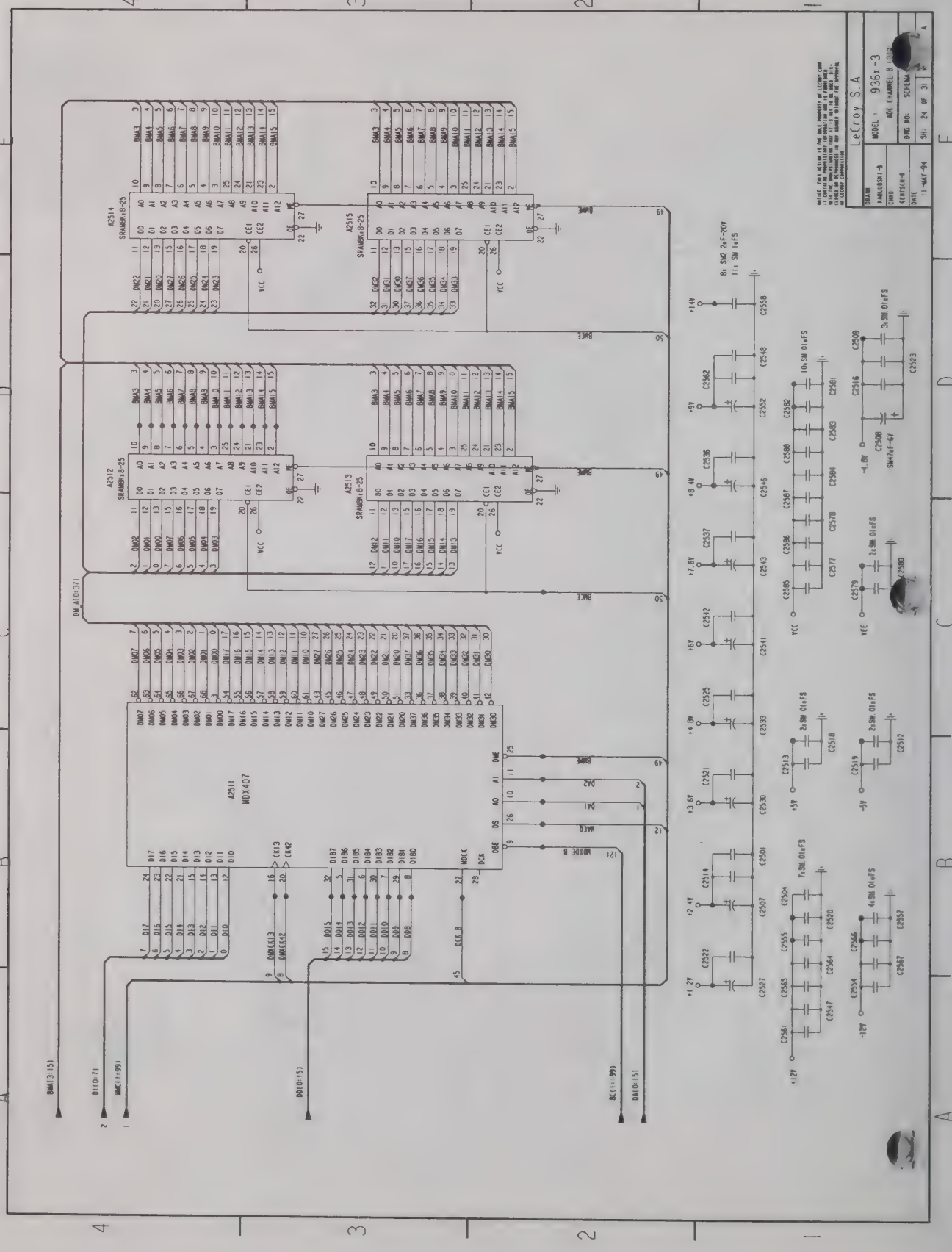

LeCroy S.A
MODEL : 936x-3
ADC CHANNEL A 11/31
SCHEMA-9360-3
11-MAY-94
A1502
HMD418
A1516
SMA09630
A1506
SMA08844
A1503
SMLM6365
A1504
SMCA43100
A1507
SMLM6124
A1509
SMLM6124
TP1500
TP1502
VCAP
VTEMPA
VDA_A11:41
MWD_DIR1
MWD_DIR2
MWD_DIR3
MWD_DIR4
MWD_DIR5
MWD_DIR6
MWD_DIR7
MWD_DIR8
MWD_DIR9
MWD_DIR10
MWD_DIR11
MWD_DIR12
MWD_DIR13
MWD_DIR14
MWD_DIR15
MWD_DIR16
MWD_DIR17
MWD_DIR18
MWD_DIR19
MWD_DIR20
MWD_DIR21
MWD_DIR22
MWD_DIR23
MWD_DIR24
MWD_DIR25
MWD_DIR26
MWD_DIR27
MWD_DIR28
MWD_DIR29
MWD_DIR30
MWD_DIR31
MWD_DIR32

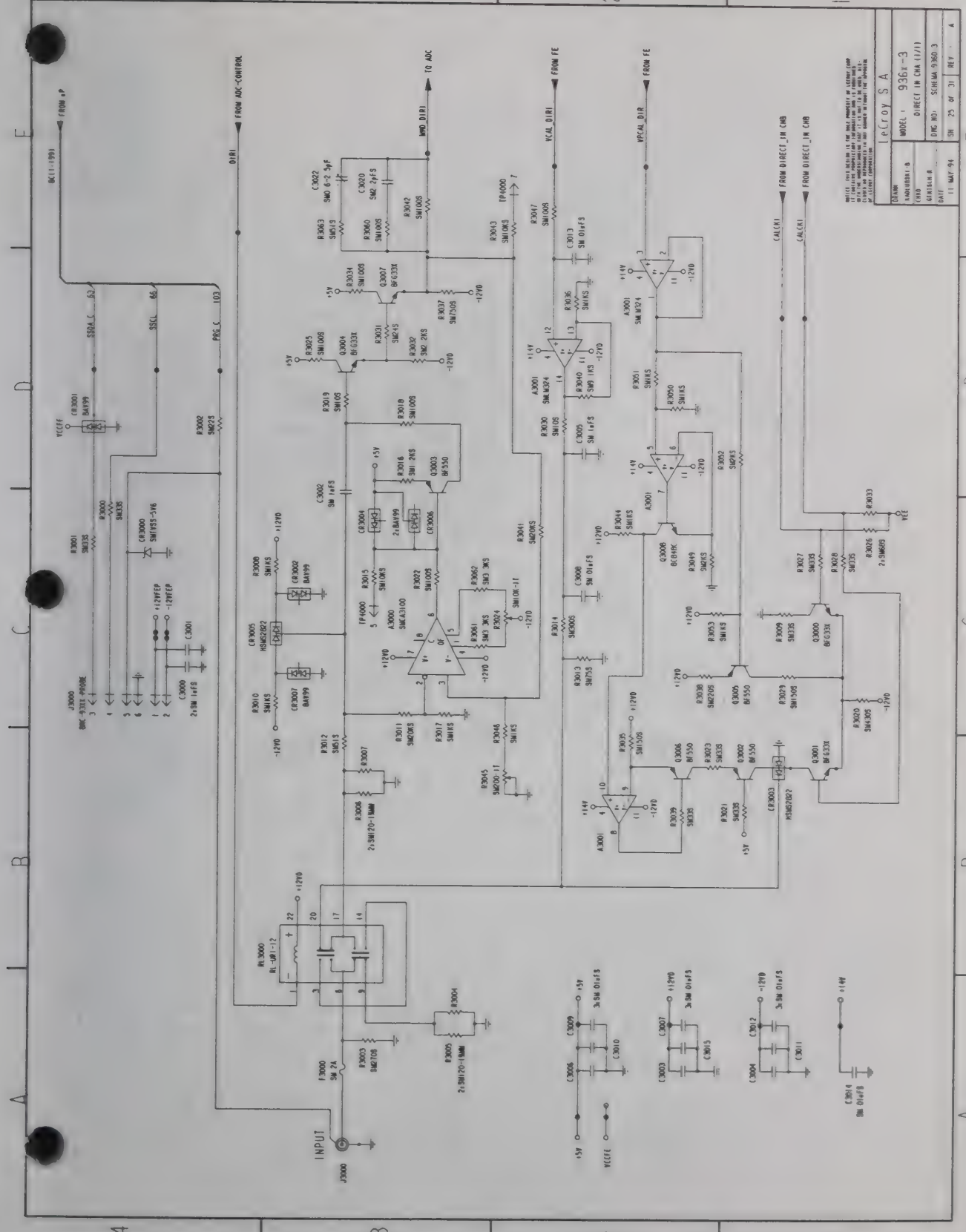


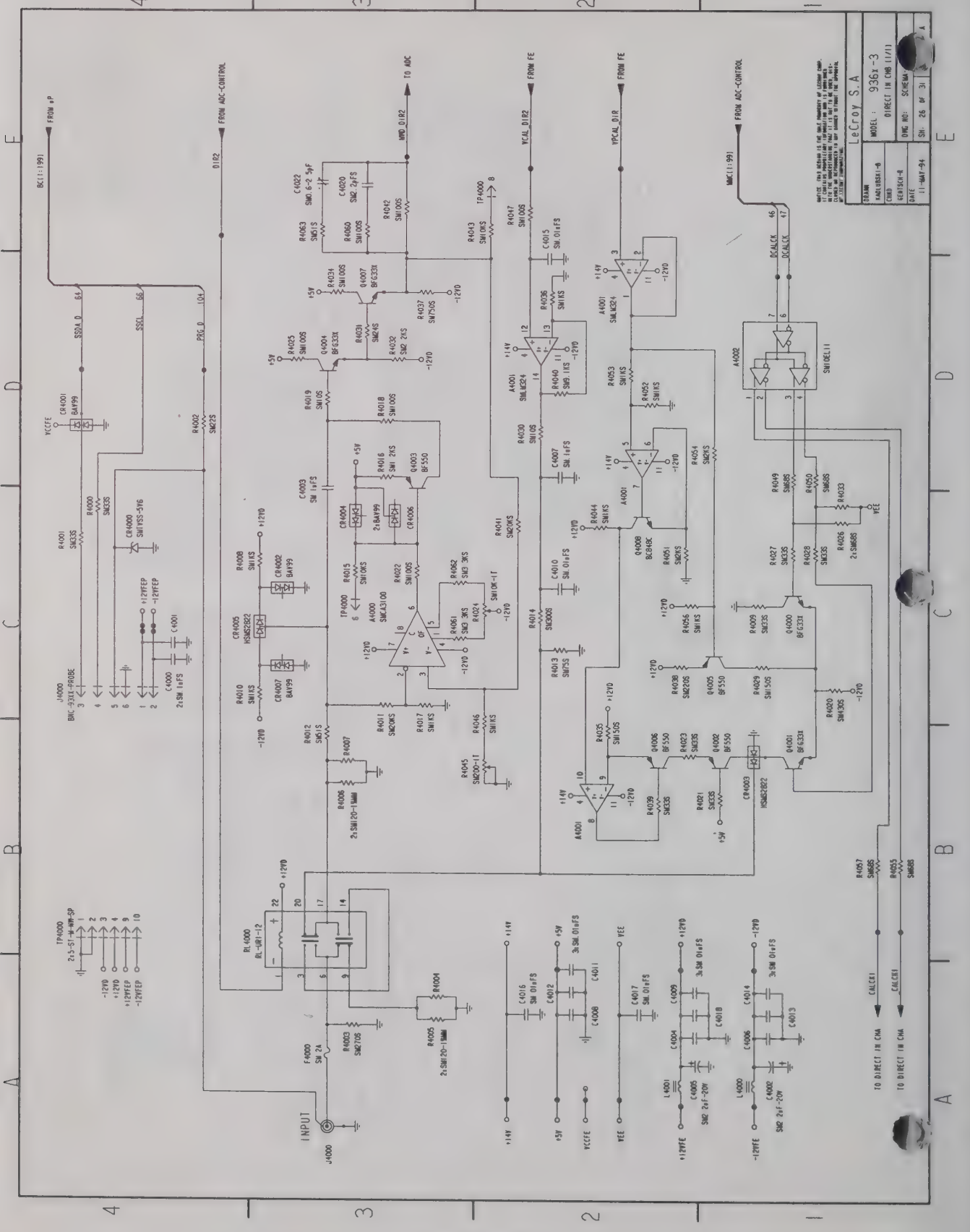

LeCroy S.A
MODEL : 9362-3
ADC CHANNEL A (3/3)
DWG NO: SCHEMA-9360-3
SH: 21 OF 31
REV : A
DRAWN
CHKD
DATE
11-MAY-94
A1511
WDX407
A1512
A1513
A1514
A1515
SRAM8K:8-25
DM_A(0:17)
DM(0:31)
DM(32:63)
DM(64:95)
DM(96:127)
DM(128:159)
DM(160:191)
DM(192:223)
DM(224:255)
DM(256:287)
DM(288:319)
DM(320:351)
DM(352:383)
DM(384:415)
DM(416:447)
DM(448:479)
DM(480:511)
DM(512:543)
DM(544:575)
DM(576:607)
DM(608:639)
DM(640:671)
DM(672:703)
DM(704:735)
DM(736:767)
DM(768:799)
DM(800:831)
DM(832:863)
DM(864:895)
DM(896:927)
DM(928:959)
DM(960:991)
DM(992:1023)
D(0:7)
D(8:15)
D(16:23)
D(24:31)
DA(0:15)
DB(0:15)
DC(0:15)
DD(0:15)
DMWE
DMCE
DMOE
DMCLK
MACQ
MDXOE A
DCK A
DAI
DA2
+14V
+9V
+8.4V
+7.6V
+6V
+4.8V
+3.6V
+2.4V
+1.2V
-12V
+12V
+5V
-5V
+4 8V
-4 8V
VCC
VEE

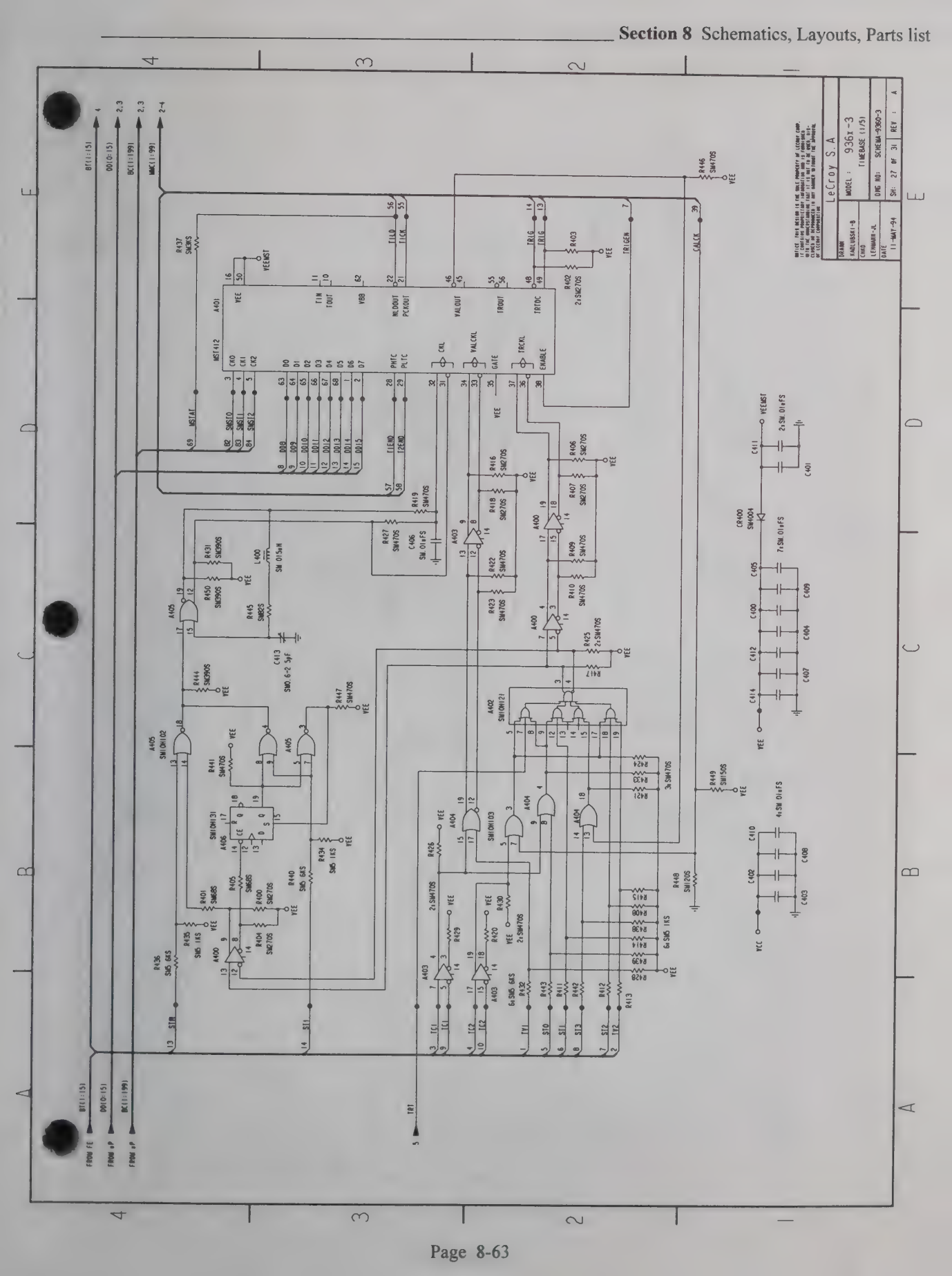

LeCroy S.A
MODEL : 936x-3
ADC CHANNEL B (1/3)
A2502
HMD418
A2504
SMA43100
A2507
A2516
SMA09630
A2506
SMA0844
A2503
SMA0365
Q2510
BFR92A
Q2507
BFR92A
Q2511
MOSOT
Q2504
SST309
Q2502
BC858C
Q2500
BC858C
Q2513
BC858C
Q2506
2xBF520
CR2504
HSMS2822
CR2505
HSMS2822
CR2503
HSMS2822
CR2500
BZX84-C6V2
CR2501
BAV99
L2503
L2501
L2504
MURATA206
TP2500
2x4-ST-W-HH-SP
TP2502
2x5-ST-W-HH-SP
HSHIN_B
QTOUT_B
ADCIN_B
VEE
VEE
VEE
VEE
VTEMPB
VOA_B(1:4)
HMDTP_B
HMD_DIR2
HMC(1:99)
IRST
YCAP
YZ
YREF
ROCK
READ
0.25G
0.5G
1.25G
2.5G
5G
CLR
AMP_B
RIC_B
MCK_B
SUB
OUT
DMP
IOUT
BIAS
IAA
+IN
-IN

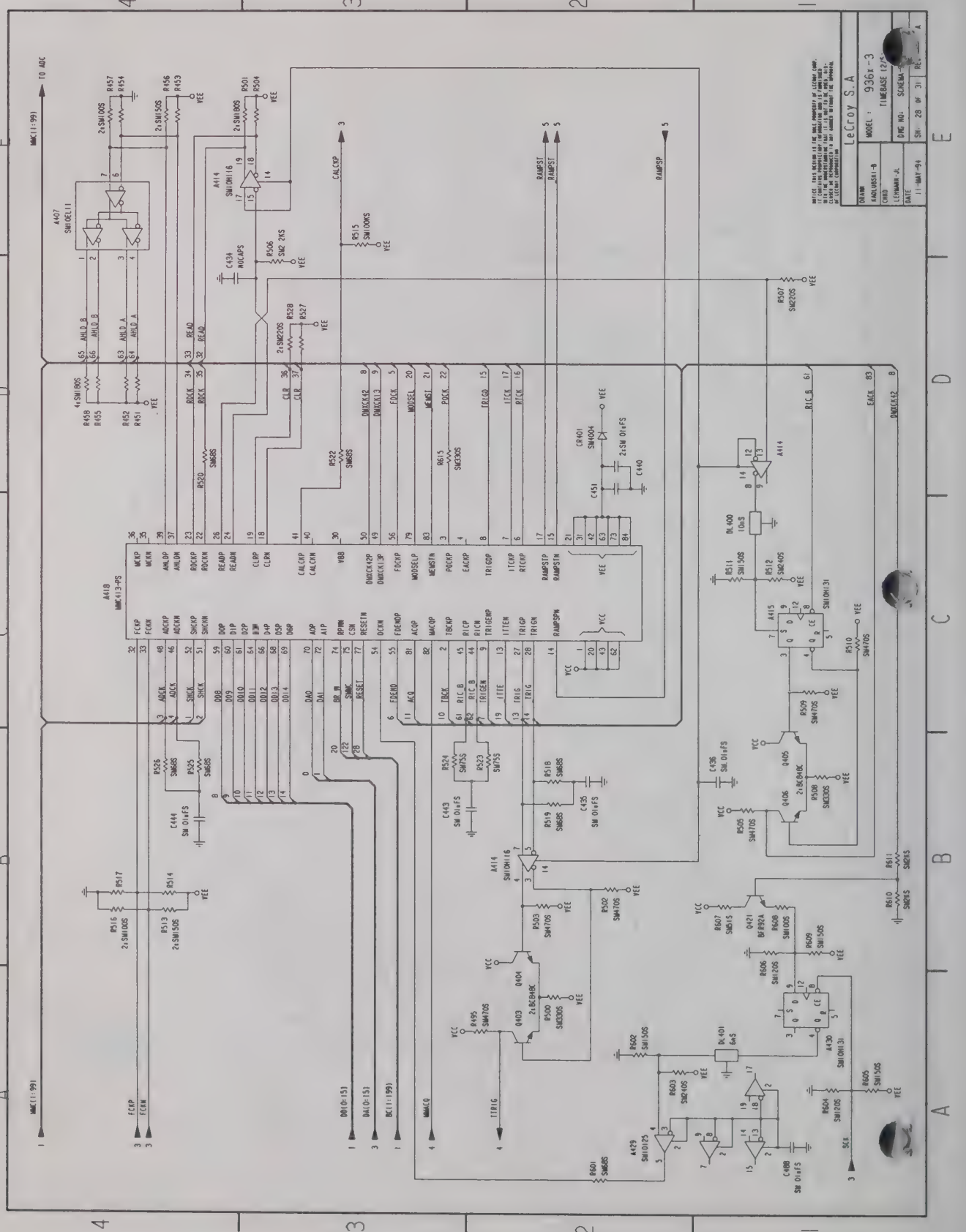


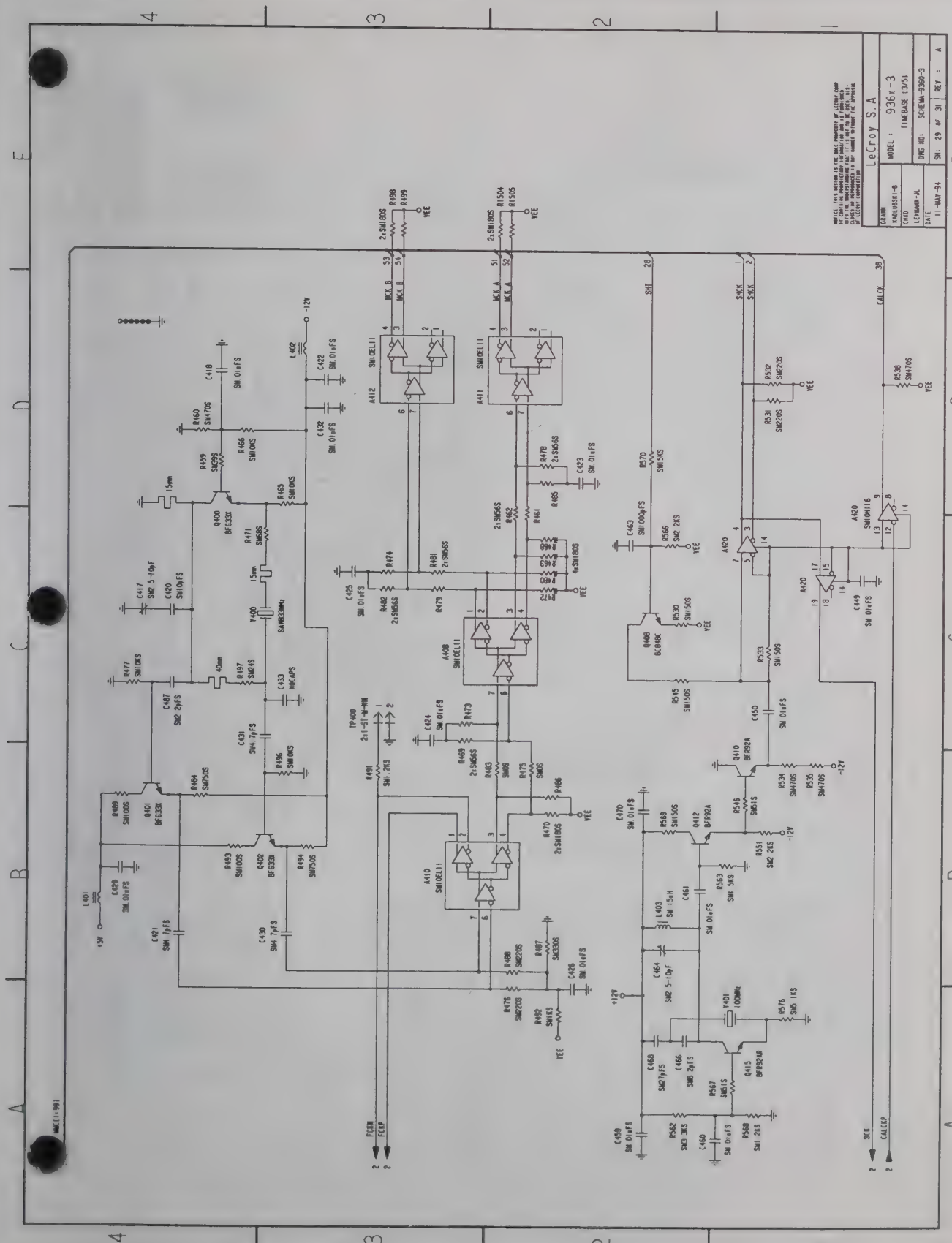


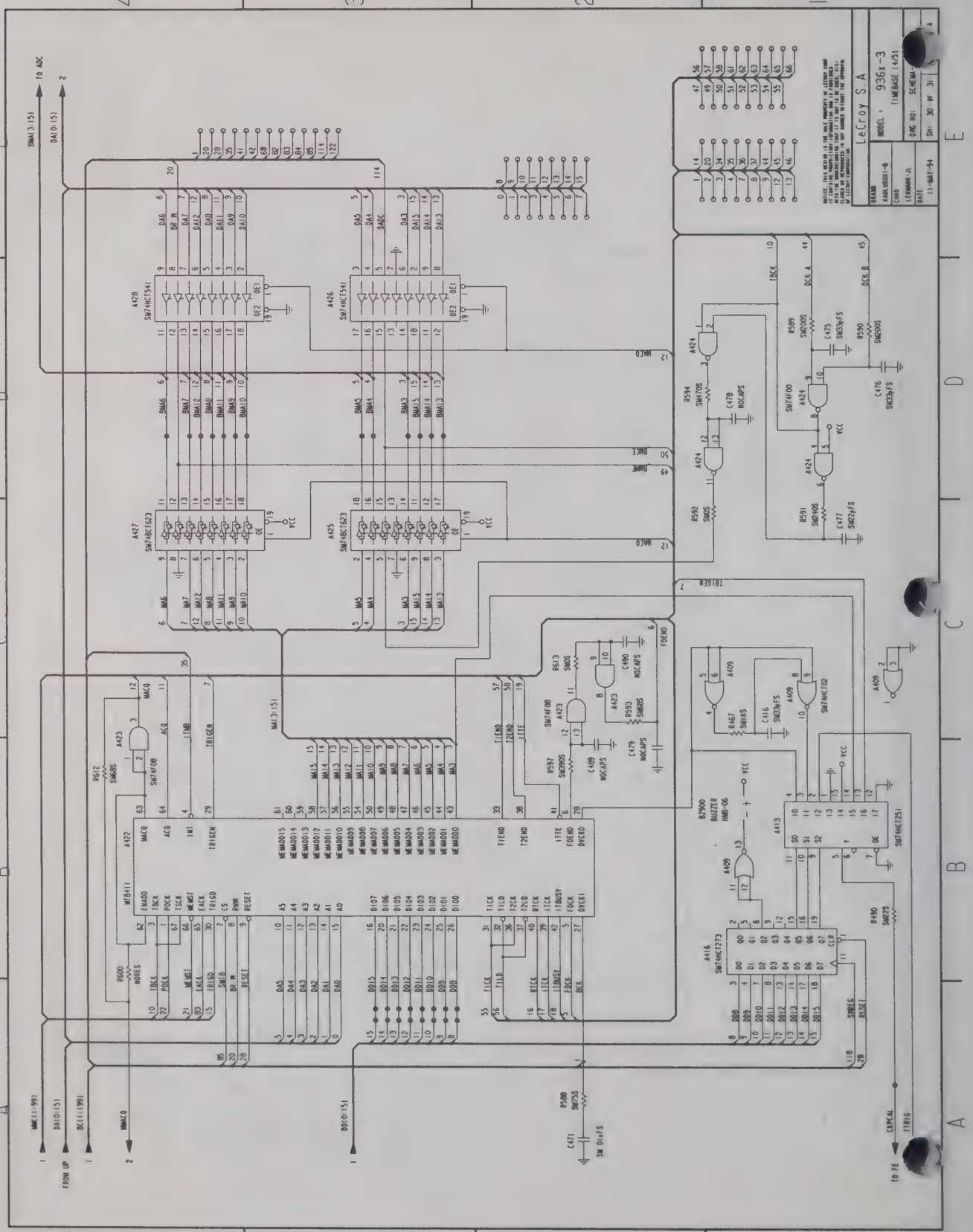

LeCroy S A
MODEL : 936x-3
DIRECT IN CHA (1/1)
DWG NO: SCHEMA 9360 3
SH 25 OF 31
REV A
11 MAY 94
INPUT
J3000
FROM DIRECT_IN CHB
FROM DIRECT_IN CHB
FROM FE
FROM FE
TO ADC
FROM ADC-CONTROL
FROM uP
VCAL_DIR
VPCAL_DIR
MWD_DIR
DIR
CALCK
CALCK
VCCFE
VEE

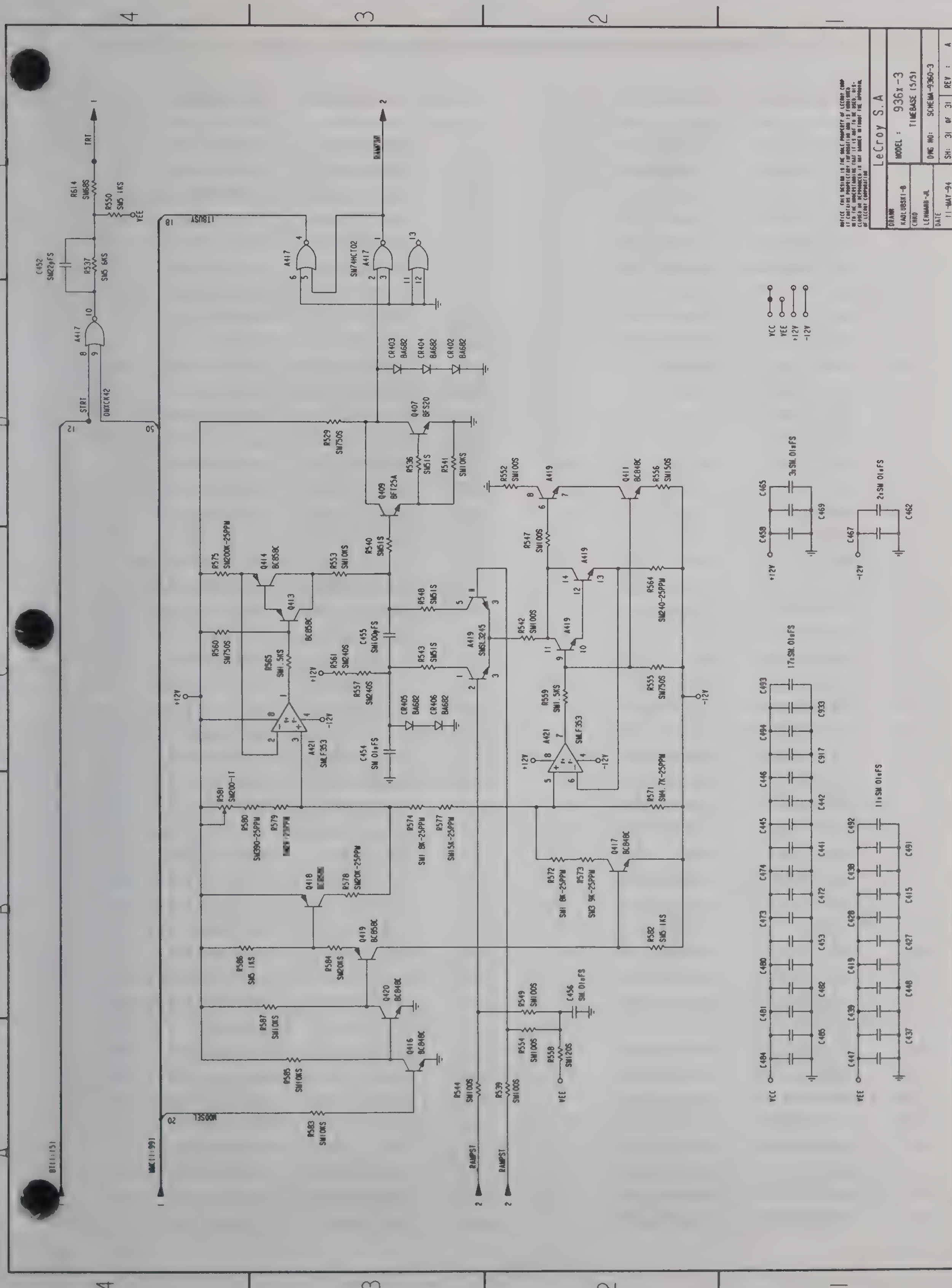

LeCroy S.A
MODEL : 936x-3
DIRECT IN CHB (1/1)
DWG NO: SCHEMA
SH: 26 OF 31
DRAWN
CHKD
DATE
11-MAY-94
INPUT
FROM +P
FROM ADC-CONTROL
TO ADC
FROM FE
FROM FE
FROM ADC-CONTROL
TO DIRECT IN CHA
TO DIRECT IN CHA
J4000
TP4000
RL4000
F4000
A4001
A4002
Q4000
Q4001
Q4002
Q4003
Q4004
Q4005
Q4006
Q4007
Q4008
CR4000
CR4001
CR4002
CR4003
CR4004
CR4005
CR4006
CR4007
L4000
L4001
R4000
R4001
R4002
R4003
R4004
R4005
R4006
R4007
R4008
R4009
R4010
R4011
R4012
R4013
R4014
R4015
R4016
R4017
R4018
R4019
R4020
R4021
R4022
R4023
R4024
R4025
R4026
R4027
R4028
R4029
R4030
R4031
R4032
R4033
R4034
R4035
R4036
R4037
R4038
R4039
R4040
R4041
R4042
R4043
R4044
R4045
R4046
R4047
R4049
R4050
R4051
R4052
R4053
R4054
R4055
R4056
R4057
R4060
R4061
R4062
R4063
C4000
C4001
C4002
C4003
C4004
C4005
C4006
C4007
C4008
C4009
C4010
C4011
C4012
C4013
C4014
C4015
C4016
C4017
C4018
C4020
C4022
+14V
+5V
VCCFE
VEE
-12V
+12V
+12VFE
-12VFE
+12VFEP
-12VFEP
DCALCK
SHIDELII
VCAL_DIR
VPCAL_DIR
MMD_DIR2
D1R2
BC(1:1991)
MAC(1:991)
CALCK1
CALCK1


LeCroy S.A
MODEL : 936z -3
TIMEBASE (1/5)
DWG NO: SCHEMA-9360-3
SH: 27 OF 31
REV : A
DRAWN
CHKD
DATE
11-MAY-94




LeCroy S.A
MODEL : 936x-3
TIMEBASE (3/5)
DWG NO: SCHEMA-9360-3
SH: 29 OF 31
REV : A
DATE 11-MAY-94




LeCroy S.A

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
A100	SM208470347	SMLF347
A101	SM207770201	SMDG201
A102	SM208470347	SMLF347
A103	SM207770201	SMDG201
A104	SM208870339	SMLM339
A105	SM208470705	SMAD705
A106	SM207770442	SMDG442
A107	SM207770403	SMDG403
A108	SM207770403	SMDG403
A109	208122002	7805
A110	208124002	7905
A111	208123002	7812
A112	208124003	7912
A113	208123002	7812
A114	208124003	7912
A200	SM208470358	SMLM358
A201	208124002	7905
A202	SM208572951	SMLP2951
A203	SM200167105	SM10H105
A204	208124003	LM320T-12
A205	SM208473100	SMCA3100
A206	SM207460116	SM10H116
A207	208123002	LM340T-12
A208	SM205618594	SM74HC594
A209	SM207288800	SMDAC8800
A210	SM207460116	SM10H116
A211	208122002	7805
A212	SM208470324	SMLM324
A213	SM207460116	SM10H116
A214	208122002	7805
A215	SM208470324	SMLM324
A400	SM207460116	SM10H116
A401	MST412	MST412
A402	SM200167121	SM10H121
A403	SM207460116	SM10H116
A404	SM200167103	SM10H103
A405	SM200167102	SM10H102
A406	SM200167131	SM10H131
A407	SM201174011	SM10EL11
A408	SM201174011	SM10EL11
A409	SM200178002	SM74HCT02
A410	SM201174011	SM10EL11
A411	SM201174011	SM10EL11
A412	SM201174011	SM10EL11
A413	SM207978251	SM74HCT251
A414	SM207460116	SM10H116
A415	SM200167131	SM10H131
A416	SM200178273	SM74HCT273
A417	SM200178002	SM74HCT02
A418	MMC413	MMC413
A419	SM208030245	SMSL3245
A420	SM207460116	SM10H116
A421	SM208470353	SMLF353
A422	MTB411	MTB411
A423	SM200172008	SM74F08
A424	SM200172000	SM74F00
A425	SM206886623	SM74BCT623
A426	SM207178541	SM74HCT541
A427	SM206886623	SM74BCT623
A428	SM207178541	SM74HCT541
A429	SM207360125	SM10125
A430	SM200167131	SM10H131
A900	SM200178138	SM74HCT138
A901	SM200178138	SM74HCT138
A902	SM206260858	SMADC0858
A903	SM200178000	SM74HCT00
A904	SM205108002	SMPCF8582A
A905	SM205618165	SM74HCT165
A906	SM206070584	SMPCD8584
A907	SM200178138	SM74HCT138
A908	SM200178030	SM74HCT30
A909	SM207970351	SM74HC4351
A910	SM207978251	SM74HCT251
A911	SM200178008	SM74HCT08
A912	SM207178541	SM74HCT541
A913	SM207878245	SM74HCT245
A914	SM207178541	SM74HCT541
A915	SM207878245	SM74HCT245
A916	SM207178541	SM74HCT541
A917	SM207178541	SM74HCT541
A918	SM200178139	SM74HCT139
A919	205750000	C16L8L
A920	205750000	C16L8L
A921	SM207178541	SM74HCT541
A922	SM200278040	SM74HCT4040
A923	MCL404	MCL404
A924	SM200178074	SM74HCT74
A925	SM200178374	SM74HCT374
A926	SM207280703	SMDAC703
A927	205750000	C16R4L

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
A928	SM208470353	SMLF353
A930	SM208470353	SMLF353
A1000	SM208870339	SMLM339
A1001	SM208470705	SMAD705
A1002	SM207770201	SMDG201
A1003	MFE409	MFE409
A1004	SM289772003	SMULN2003
A1005	SM205618594	SM74HC594
A1006	SM207770403	SMDG403
A1007	SM208470358	SMLM358
A1008	SM205618594	SM74HC594
A1009	SM200178002	SM74HCT02
A1500	SM208470324	SMLM324
A1502	HWD418	HWD418
A1503	SM208476365	SMLM6365
A1504	SM208473100	SMCA3100
A1505	HSH410	HSH410
A1506	SM208470844	SMAD844
A1507	SM208470324	SMLM324
A1508	207200508	SP97508B-
A1509	SM207360125	SM10125
A1510	SM207360125	SM10125
A1511	MDX407	MDX407
A1512	SM205228863	SRAM8Kx8-25
A1513	SM205228863	SRAM8Kx8-25
A1514	SM205228863	SRAM8Kx8-25
A1515	SM205228863	SRAM8Kx8-25
A1516	SM208479630	SMAD9630
A2000	SM208870339	SMLM339
A2001	SM208470705	SMAD705
A2002	SM207770201	SMDG201
A2003	MFE409	MFE409
A2004	SM289772003	SMULN2003
A2005	SM205618594	SM74HC594
A2006	SM207770403	SMDG403
A2007	SM208470358	SMLM358
A2008	SM205618594	SM74HC594
A2009	SM200178002	SM74HCT02
A2501	SM208470324	SMLM324
A2502	HWD418	HWD418
A2503	SM208476365	SMLM6365
A2504	SM208473100	SMCA3100
A2505	HSH410	HSH410
A2506	SM208470844	SMAD844
A2507	SM208470324	SMLM324
A2508	207200508	SP97508B-
A2509	SM207360125	SM10125
A2510	SM207360125	SM10125
A2511	MDX407	MDX407
A2512	SM205228863	SRAM8Kx8-25
A2513	SM205228863	SRAM8Kx8-25
A2514	SM205228863	SRAM8Kx8-25
A2515	SM205228863	SRAM8Kx8-25
A2516	SM208479630	SMAD9630
A3000	SM208473100	SMCA3100
A3001	SM208470324	SMLM324
A4000	SM208473100	SMCA3100
A4001	SM208470324	SMLM324
A4002	SM201174011	SM10EL11
A5000	SM208470705	SMAD705
A5001	MTR408	MTR408
A5002	MTR408	MTR408
A5003	SM207978153	SM74HCT153
A5004	SM205618594	SM74HC594
A5005	SM205618594	SM74HC594
A5006	SM207770442	SMDG442
A5007	SM208971881	SMLM1881
A5008	SM205618594	SM74HC594
A5009	SM205618594	SM74HC594
A5010	SM207770442	SMDG442
A5011	SM208470037	SMOP37
A6000	SM208470353	SMLF353
C100	SM661726103	SM.01uF-NPO
C101	SM661726103	SM.01uF-NPO
C102	SM661207103	SM.01uFS
C103	SM661207103	SM.01uFS
C104	SM661726103	SM.01uF-NPO
C105	SM661726103	SM.01uF-NPO
C106	SM661207103	SM.01uFS
C107	SM661207103	SM.01uFS
C108	SM661726103	SM.01uF-NPO
C109	SM661726103	SM.01uF-NPO
C110	SM661207103	SM.01uFS
C111	SM661207103	SM.01uFS
C112	SM661207103	SM.01uFS
C113	SM661207103	SM.01uFS
C114	SM661207103	SM.01uFS
C115	SM661726103	SM.01uF-NPO
C116	SM661726103	SM.01uF-NPO
C117	SM661207104	SM.1uFS

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description	Location	Part Number	Description
C118	SM661207103	SM.01uFS	C233	SM661207103	SM.01uFS
C119	SM661207103	SM.01uFS	C234	SM666247106	SM10uF-25V
C120	SM661207103	SM.01uFS	C235	SM666237476	SM47uF-6V
C121	SM661207103	SM.01uFS	C236	SM661207103	SM.01uFS
C122	SM661207103	SM.01uFS	C237	SM666247106	SM10uF-25V
C123	SM661207103	SM.01uFS	C238	SM661207103	SM.01uFS
C124	SM666327225	SM2.2uF-20V	C239	SM661207103	SM.01uFS
C125	SM666327225	SM2.2uF-20V	C240	SM661207103	SM.01uFS
C126	SM666327225	SM2.2uF-20V	C241	SM666247106	SM10uF-25V
C127	SM666327225	SM2.2uF-20V	C242	SM661207103	SM.01uFS
C128	SM666327225	SM2.2uF-20V	C243	SM666237476	SM47uF-6V
C129	SM666327225	SM2.2uF-20V	C255	SM666237476	SM47uF-6V
C130	SM666327225	SM2.2uF-20V	C400	SM661207103	SM.01uFS
C131	SM666327225	SM2.2uF-20V	C401	SM661207103	SM.01uFS
C200	SM661207103	SM.01uFS	C402	SM661207103	SM.01uFS
C201	SM661207103	SM.01uFS	C403	SM661207103	SM.01uFS
C202	SM661207103	SM.01uFS	C404	SM661207103	SM.01uFS
C203	SM666237476	SM47uF-6V	C405	SM661207103	SM.01uFS
C204	SM666237476	SM47uF-6V	C406	SM661207103	SM.01uFS
C205	SM661207103	SM.01uFS	C407	SM661207103	SM.01uFS
C206	SM661255330	SM33pFS	C408	SM661207103	SM.01uFS
C207	SM666247106	SM10uF-25V	C409	SM661207103	SM.01uFS
C208	SM661207103	SM.01uFS	C410	SM661207103	SM.01uFS
C209	SM661207103	SM.01uFS	C411	SM661207103	SM.01uFS
C210	SM666247106	SM10uF-25V	C412	SM661207103	SM.01uFS
C211	SM666247106	SM10uF-25V	C413	SM158240200	SM0.6-2.5pF
C212	SM661207103	SM.01uFS	C414	SM661207103	SM.01uFS
C213	SM661207103	SM.01uFS	C415	SM661207103	SM.01uFS
C214	SM661207103	SM.01uFS	C416	SM661255330	SM33pFS
C215	SM666247106	SM10uF-25V	C417	SM158240202	SM2.5-10pF
C216	SM661207103	SM.01uFS	C418	SM661207103	SM.01uFS
C217	SM661207103	SM.01uFS	C419	SM661207103	SM.01uFS
C218	SM661207103	SM.01uFS	C420	SM661255100	SM10pFS
C220	SM661207103	SM.01uFS	C421	SM661250047	SM4.7pFS
C221	SM666247106	SM10uF-25V	C422	SM661207103	SM.01uFS
C222	SM661207103	SM.01uFS	C423	SM661207103	SM.01uFS
C223	SM661207103	SM.01uFS	C424	SM661207103	SM.01uFS
C224	SM661207103	SM.01uFS	C425	SM661207103	SM.01uFS
C225	SM666247106	SM10uF-25V	C426	SM661207103	SM.01uFS
C227	SM661207103	SM.01uFS	C427	SM661207103	SM.01uFS
C228	SM661250047	SM4.7pFS	C428	SM661207103	SM.01uFS
C229	SM666247106	SM10uF-25V	C429	SM661207103	SM.01uFS
C230	SM661207103	SM.01uFS	C430	SM661250047	SM4.7pFS
C231	SM661207103	SM.01uFS	C431	SM661250047	SM4.7pFS
C232	SM666247106	SM10uF-25V	C432	SM661207103	SM.01uFS

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
C435	SM661207103	SM.01uFS
C436	SM661207103	SM.01uFS
C437	SM661207103	SM.01uFS
C438	SM661207103	SM.01uFS
C439	SM661207103	SM.01uFS
C440	SM661207103	SM.01uFS
C441	SM661207103	SM.01uFS
C442	SM661207103	SM.01uFS
C443	SM661207103	SM.01uFS
C444	SM661207103	SM.01uFS
C445	SM661207103	SM.01uFS
C446	SM661207103	SM.01uFS
C447	SM661207103	SM.01uFS
C448	SM661207103	SM.01uFS
C449	SM661207103	SM.01uFS
C450	SM661207103	SM.01uFS
C451	SM661207103	SM.01uFS
C452	SM661255220	SM22pFS
C453	SM661207103	SM.01uFS
C454	SM661207103	SM.01uFS
C455	SM661255101	SM100pFS
C456	SM661207103	SM.01uFS
C457	SM661207103	SM.01uFS
C458	SM661207103	SM.01uFS
C459	SM661207103	SM.01uFS
C460	SM661207103	SM.01uFS
C461	SM661207103	SM.01uFS
C462	SM661207103	SM.01uFS
C463	SM661255102	SM1000pFS
C464	SM158240202	SM2.5-10pF
C465	SM661207103	SM.01uFS
C466	SM661250082	SM8.2pFS
C467	SM661207103	SM.01uFS
C468	SM661255270	SM27pFS
C469	SM661207103	SM.01uFS
C470	SM661207103	SM.01uFS
C471	SM661207103	SM.01uFS
C472	SM661207103	SM.01uFS
C473	SM661207103	SM.01uFS
C474	SM661207103	SM.01uFS
C475	SM661255330	SM33pFS
C476	SM661255330	SM33pFS
C477	SM661255220	SM22pFS
C480	SM661207103	SM.01uFS
C481	SM661207103	SM.01uFS
C482	SM661207103	SM.01uFS
C484	SM661207103	SM.01uFS
C485	SM661207103	SM.01uFS
C487	SM661255022	SM2.2pFS
C488	SM661207103	SM.01uFS
C491	SM661207103	SM.01uFS
C492	SM661207103	SM.01uFS
C493	SM661207103	SM.01uFS
C494	SM661207103	SM.01uFS
C900	SM661207103	SM.01uFS
C901	SM661207103	SM.01uFS
C902	SM666327225	SM2.2uF-20V
C903	SM661207104	SM.1uFS
C905	SM661207104	SM.1uFS
C906	SM661207104	SM.1uFS
C907	SM661207104	SM.1uFS
C908	SM661207104	SM.1uFS
C909	SM661255181	SM180pFS
C910	SM661207104	SM.1uFS
C911	SM661207104	SM.1uFS
C912	SM661207104	SM.1uFS
C913	SM661207104	SM.1uFS
C914	SM661207103	SM.01uFS
C915	SM661207103	SM.01uFS
C916	SM661207103	SM.01uFS
C917	SM661207103	SM.01uFS
C918	SM661207103	SM.01uFS
C919	SM661207103	SM.01uFS
C920	SM661207103	SM.01uFS
C921	SM661207103	SM.01uFS
C922	SM661207103	SM.01uFS
C923	SM661207103	SM.01uFS
C924	SM661207103	SM.01uFS
C925	SM661207103	SM.01uFS
C926	SM661207103	SM.01uFS
C927	SM661207103	SM.01uFS
C928	SM661207103	SM.01uFS
C929	SM661207103	SM.01uFS
C930	SM661207103	SM.01uFS
C931	SM661207103	SM.01uFS
C932	SM661207104	SM.1uFS
C933	SM661207103	SM.01uFS
C934	146544471	470uF-25V
C935	SM661207103	SM.01uFS
C936	SM666247106	SM10uF-25V

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
C937	SM661207104	SM.1uFS
C938	SM661207103	SM.01uFS
C939	SM661207103	SM.01uFS
C940	SM661207103	SM.01uFS
C941	SM661207104	SM.1uFS
C942	SM661207103	SM.01uFS
C944	SM661207103	SM.01uFS
C945	SM661207104	SM.1uFS
C946	SM666247106	SM10uF-25V
C947	SM661207103	SM.01uFS
C948	SM661207103	SM.01uFS
C949	SM661207103	SM.01uFS
C950	SM661207103	SM.01uFS
C951	SM661207103	SM.01uFS
C954	SM661207104	SM.1uFS
C955	SM661207103	SM.01uFS
C956	SM661207103	SM.01uFS
C1000	SM661207104	SM.1uFS
C1001	SM661207103	SM.01uFS
C1002	SM661207103	SM.01uFS
C1003	SM661207104	SM.1uFS
C1004	SM661207104	SM.1uFS
C1005	SM661255056	SM5.6pFS
C1006	SM661207103	SM.01uFS
C1007	SM661207103	SM.01uFS
C1008	SM661207104	SM.1uFS
C1009	158849012	5-15pF-S
C1010	SM661256120	SM12pFS
C1011	SM661255150	SM15pFS
C1012	SM661255820	SM82pFS
C1014	SM661207103	SM.01uFS
C1015	SM661495561	SM560pFS-500V
C1016	SM661207104	SM.1uFS
C1017	SM661207103	SM.01uFS
C1018	SM661207103	SM.01uFS
C1019	SM661207103	SM.01uFS
C1020	SM661207223	SM.022uFS
C1021	SM661207103	SM.01uFS
C1022	SM661207103	SM.01uFS
C1023	SM661207104	SM.1uFS
C1024	SM661207103	SM.01uFS
C1025	SM661207103	SM.01uFS
C1026	SM661207103	SM.01uFS
C1027	SM661255056	SM5.6pFS
C1028	SM661207103	SM.01uFS
C1029	158849009	0.5-2.5pF-S
C1030	SM661255220	SM22pFS
C1031	SM661207103	SM.01uFS
C1032	SM661207103	SM.01uFS
C1033	SM661207103	SM.01uFS
C1035	SM661207103	SM.01uFS
C1036	SM661207103	SM.01uFS
C1037	SM661207103	SM.01uFS
C1038	SM661207103	SM.01uFS
C1039	SM661255101	SM100pFS
C1040	SM661207103	SM.01uFS
C1041	SM661207103	SM.01uFS
C1042	SM661207103	SM.01uFS
C1043	SM661207103	SM.01uFS
C1044	SM661207103	SM.01uFS
C1045	SM661207103	SM.01uFS
C1046	SM661207103	SM.01uFS
C1047	SM661207103	SM.01uFS
C1048	SM661207103	SM.01uFS
C1049	SM661207103	SM.01uFS
C1050	SM661207103	SM.01uFS
C1051	SM661207103	SM.01uFS
C1052	SM666327225	SM2.2uF-20V
C1053	SM666327225	SM2.2uF-20V
C1054	SM666327225	SM2.2uF-20V
C1055	SM666327225	SM2.2uF-20V
C1056	SM666327225	SM2.2uF-20V
C1057	SM661255181	SM180pFS
C1058	SM661255270	SM27pFS
C1500	SM661207103	SM.01uFS
C1501	SM661207103	SM.01uFS
C1503	SM661207103	SM.01uFS
C1504	SM661207104	SM.1uFS
C1505	SM666427105	SM1uF-16V
C1506	SM661207103	SM.01uFS
C1507	SM666427105	SM1uF-16V
C1509	SM666327225	SM2.2uF-20V
C1510	SM666237476	SM47uF-6V
C1511	SM661207103	SM.01uFS
C1512	SM661207103	SM.01uFS
C1513	SM661207103	SM.01uFS
C1514	SM661207103	SM.01uFS
C1515	SM661207103	SM.01uFS
C1516	SM661207103	SM.01uFS
C1517	SM661207104	SM.1uFS

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
C1518	SM661207104	SM.1uFS
C1519	SM661207103	SM.01uFS
C1520	SM661207103	SM.01uFS
C1521	SM661207103	SM.01uFS
C1522	SM661207103	SM.01uFS
C1523	SM661207103	SM.01uFS
C1524	SM661207103	SM.01uFS
C1525	SM661207104	SM.1uFS
C1526	SM661207104	SM.1uFS
C1527	SM661207103	SM.01uFS
C1528	SM661207103	SM.01uFS
C1529	SM661207104	SM.1uFS
C1530	SM666327225	SM2.2uF-20V
C1531	SM661207103	SM.01uFS
C1532	SM661207103	SM.01uFS
C1533	SM661207103	SM.01uFS
C1534	SM666327225	SM2.2uF-20V
C1535	SM661207103	SM.01uFS
C1536	SM661207103	SM.01uFS
C1537	SM666327225	SM2.2uF-20V
C1538	SM661207103	SM.01uFS
C1539	SM661207104	SM.1uFS
C1540	SM661207104	SM.1uFS
C1541	SM661207104	SM.1uFS
C1542	SM661207104	SM.1uFS
C1543	SM666247106	SM10uF-25V
C1544	SM661207104	SM.1uFS
C1545	SM661207104	SM.1uFS
C1546	SM666327225	SM2.2uF-20V
C1547	SM661207104	SM.1uFS
C1548	SM666327225	SM2.2uF-20V
C1549	SM661207104	SM.1uFS
C1550	SM661207104	SM.1uFS
C1551	SM666327225	SM2.2uF-20V
C1552	SM661207103	SM.01uFS
C1553	SM661207104	SM.1uFS
C1554	SM661207103	SM.01uFS
C1555	SM158240200	SM0.6-2.5pF
C1556	SM666327225	SM2.2uF-20V
C1558	SM661207103	SM.01uFS
C1559	SM661207103	SM.01uFS
C1560	SM661207103	SM.01uFS
C1561	SM661207103	SM.01uFS
C1562	SM661207103	SM.01uFS
C1563	SM661207104	SM.1uFS
C1564	SM661207103	SM.01uFS
C1565	SM661207103	SM.01uFS
C1566	SM661207103	SM.01uFS
C1567	SM661207104	SM.1uFS
C1568	SM661207103	SM.01uFS
C1569	SM661207103	SM.01uFS
C1570	SM661207103	SM.01uFS
C1571	SM661207103	SM.01uFS
C1572	SM661207103	SM.01uFS
C1573	SM661255150	SM15pFS
C1574	SM661207103	SM.01uFS
C1575	SM661207103	SM.01uFS
C1576	SM661207103	SM.01uFS
C1577	SM666237476	SM47uF-6V
C1578	SM661207103	SM.01uFS
C1579	SM661207103	SM.01uFS
C1580	SM661207103	SM.01uFS
C1581	SM661207103	SM.01uFS
C1582	SM661207103	SM.01uFS
C1583	SM661207103	SM.01uFS
C1584	SM661207103	SM.01uFS
C1585	SM661207103	SM.01uFS
C1586	SM661207103	SM.01uFS
C1587	SM661207103	SM.01uFS
C1588	SM661207103	SM.01uFS
C1589	SM661207103	SM.01uFS
C1590	SM661207103	SM.01uFS
C1591	SM661207103	SM.01uFS
C1592	SM661207103	SM.01uFS
C1600	SM661207103	SM.01uFS
C2000	SM661207104	SM.1uFS
C2001	SM661207103	SM.01uFS
C2002	SM661207103	SM.01uFS
C2003	SM661207104	SM.1uFS
C2004	SM661207104	SM.1uFS
C2005	SM661255056	SM5.6pFS
C2006	SM661207103	SM.01uFS
C2007	SM661207103	SM.01uFS
C2008	SM661207104	SM.1uFS
C2009	158849012	5-15pF-S
C2010	SM661256120	SM12pFS
C2011	SM661255150	SM15pFS
C2012	SM661255820	SM82pFS
C2014	SM661207103	SM.01uFS
C2015	SM661495561	SM560pFS-500V

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
C2016	SM661207104	SM.1uFS
C2017	SM661207103	SM.01uFS
C2018	SM661207103	SM.01uFS
C2019	SM661207103	SM.01uFS
C2020	SM661207223	SM.022uFS
C2021	SM661207103	SM.01uFS
C2022	SM661207103	SM.01uFS
C2023	SM661207104	SM.1uFS
C2024	SM661207103	SM.01uFS
C2025	SM661207103	SM.01uFS
C2026	SM661207103	SM.01uFS
C2027	SM661255056	SM5.6pFS
C2028	SM661207103	SM.01uFS
C2029	158849009	0.5-2.5pF-S
C2030	SM661255220	SM22pFS
C2031	SM661207103	SM.01uFS
C2032	SM661207103	SM.01uFS
C2033	SM661207103	SM.01uFS
C2035	SM661207103	SM.01uFS
C2036	SM661207103	SM.01uFS
C2037	SM661207103	SM.01uFS
C2038	SM661207103	SM.01uFS
C2039	SM661255101	SM100pFS
C2040	SM661207103	SM.01uFS
C2041	SM661207103	SM.01uFS
C2042	SM661207103	SM.01uFS
C2043	SM661207103	SM.01uFS
C2044	SM661207103	SM.01uFS
C2045	SM661207103	SM.01uFS
C2046	SM661207103	SM.01uFS
C2047	SM661207103	SM.01uFS
C2048	SM661207103	SM.01uFS
C2049	SM661207103	SM.01uFS
C2050	SM661207103	SM.01uFS
C2051	SM661207103	SM.01uFS
C2052	SM666327225	SM2.2uF-20V
C2053	SM666327225	SM2.2uF-20V
C2054	SM666327225	SM2.2uF-20V
C2055	SM666327225	SM2.2uF-20V
C2056	SM666327225	SM2.2uF-20V
C2057	SM661255181	SM180pFS
C2058	SM661255270	SM27pFS
C2500	SM661207103	SM.01uFS
C2501	SM661207104	SM.1uFS
C2502	SM666427105	SM1uF-16V
C2503	SM666427105	SM1uF-16V
C2504	SM661207103	SM.01uFS
C2505	SM661207103	SM.01uFS
C2507	SM666327225	SM2.2uF-20V
C2508	SM666237476	SM47uF-6V
C2509	SM661207103	SM.01uFS
C2510	SM661207103	SM.01uFS
C2512	SM661207103	SM.01uFS
C2513	SM661207103	SM.01uFS
C2514	SM661207104	SM.1uFS
C2515	SM661207104	SM.1uFS
C2516	SM661207103	SM.01uFS
C2517	SM661207103	SM.01uFS
C2518	SM661207103	SM.01uFS
C2519	SM661207103	SM.01uFS
C2520	SM661207103	SM.01uFS
C2521	SM661207104	SM.1uFS
C2522	SM661207104	SM.1uFS
C2523	SM661207103	SM.01uFS
C2524	SM661207103	SM.01uFS
C2525	SM661207104	SM.1uFS
C2526	SM661207103	SM.01uFS
C2527	SM666327225	SM2.2uF-20V
C2528	SM661207103	SM.01uFS
C2529	SM661207103	SM.01uFS
C2530	SM666327225	SM2.2uF-20V
C2531	SM661207103	SM.01uFS
C2532	SM661207103	SM.01uFS
C2533	SM666327225	SM2.2uF-20V
C2534	SM661207104	SM.1uFS
C2535	SM661207104	SM.1uFS
C2536	SM661207104	SM.1uFS
C2537	SM661207104	SM.1uFS
C2538	SM666247106	SM10uF-25V
C2539	SM661207104	SM.1uFS
C2540	SM661207104	SM.1uFS
C2541	SM666327225	SM2.2uF-20V
C2542	SM661207104	SM.1uFS
C2543	SM666327225	SM2.2uF-20V
C2544	SM661207104	SM.1uFS
C2545	SM661207104	SM.1uFS
C2546	SM666327225	SM2.2uF-20V
C2547	SM661207103	SM.01uFS
C2548	SM661207104	SM.1uFS
C2549	SM661207103	SM.01uFS

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
C2550	SM158240200	SM0.6-2.5pF
C2552	SM666327225	SM2.2uF-20V
C2553	SM661207103	SM.01uFS
C2554	SM661207103	SM.01uFS
C2555	SM661207103	SM.01uFS
C2556	SM661207103	SM.01uFS
C2557	SM661207103	SM.01uFS
C2558	SM661207104	SM.1uFS
C2559	SM661207103	SM.01uFS
C2560	SM661207103	SM.01uFS
C2561	SM661207103	SM.01uFS
C2562	SM661207104	SM.1uFS
C2563	SM661207103	SM.01uFS
C2564	SM661207103	SM.01uFS
C2565	SM661207103	SM.01uFS
C2566	SM661207103	SM.01uFS
C2567	SM661207103	SM.01uFS
C2568	SM661255150	SM15pFS
C2569	SM661207103	SM.01uFS
C2570	SM661207103	SM.01uFS
C2571	SM661207103	SM.01uFS
C2572	SM666237476	SM47uF-6V
C2573	SM661207103	SM.01uFS
C2574	SM661207103	SM.01uFS
C2575	SM661207103	SM.01uFS
C2576	SM661207103	SM.01uFS
C2577	SM661207103	SM.01uFS
C2578	SM661207103	SM.01uFS
C2579	SM661207103	SM.01uFS
C2580	SM661207103	SM.01uFS
C2581	SM661207103	SM.01uFS
C2582	SM661207103	SM.01uFS
C2583	SM661207103	SM.01uFS
C2584	SM661207103	SM.01uFS
C2585	SM661207103	SM.01uFS
C2586	SM661207103	SM.01uFS
C2587	SM661207103	SM.01uFS
C2588	SM661207103	SM.01uFS
C3000	SM661207104	SM.1uFS
C3001	SM661207104	SM.1uFS
C3002	SM661207104	SM.1uFS
C3003	SM661207103	SM.01uFS
C3004	SM661207103	SM.01uFS
C3005	SM661207104	SM.1uFS
C3006	SM661207103	SM.01uFS
C3007	SM661207103	SM.01uFS
C3008	SM661207103	SM.01uFS
C3009	SM661207103	SM.01uFS
C3010	SM661207103	SM.01uFS
C3011	SM661207103	SM.01uFS
C3012	SM661207103	SM.01uFS
C3013	SM661207103	SM.01uFS
C3014	SM661207103	SM.01uFS
C3015	SM661207103	SM.01uFS
C3020	SM661255022	SM2.2pFS
C3022	SM158240200	SM0.6-2.5pF
C4000	SM661207104	SM.1uFS
C4001	SM661207104	SM.1uFS
C4002	SM666327225	SM2.2uF-20V
C4003	SM661207104	SM.1uFS
C4004	SM661207103	SM.01uFS
C4005	SM666327225	SM2.2uF-20V
C4006	SM661207103	SM.01uFS
C4007	SM661207104	SM.1uFS
C4008	SM661207103	SM.01uFS
C4009	SM661207103	SM.01uFS
C4010	SM661207103	SM.01uFS
C4011	SM661207103	SM.01uFS
C4012	SM661207103	SM.01uFS
C4013	SM661207103	SM.01uFS
C4014	SM661207103	SM.01uFS
C4015	SM661207103	SM.01uFS
C4016	SM661207103	SM.01uFS
C4017	SM661207103	SM.01uFS
C4018	SM661207103	SM.01uFS
C4019	SM661207103	SM.01uFS
C4020	SM661255022	SM2.2pFS
C4022	SM158240200	SM0.6-2.5pF
C5000	SM661250047	SM4.7pFS
C5001	SM661207104	SM.1uFS
C5002	SM661207104	SM.1uFS
C5003	SM661255027	SM2.7pFS
C5004	SM661207103	SM.01uFS
C5005	SM661255033	SM3.3pFS
C5006	SM661495561	SM560pFS-500V
C5007	SM661207103	SM.01uFS
C5008	SM661207103	SM.01uFS
C5009	SM661207103	SM.01uFS
C5010	SM661207103	SM.01uFS
C5011	SM661255022	SM2.2pFS

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
C5012	SM661207103	SM.01uFS
C5013	SM661207103	SM.01uFS
C5014	SM661255470	SM47pFS
C5015	SM661207103	SM.01uFS
C5016	SM661255270	SM27pFS
C5017	SM661255270	SM27pFS
C5018	SM661207103	SM.01uFS
C5019	SM661207103	SM.01uFS
C5020	SM661207103	SM.01uFS
C5021	SM661207103	SM.01uFS
C5022	SM661255270	SM27pFS
C5023	SM661255270	SM27pFS
C5024	SM666427105	SM1uF-16V
C5025	SM661207103	SM.01uFS
C5026	SM661205822	SM.0082uFS
C5027	SM661207103	SM.01uFS
C5028	SM666427105	SM1uF-16V
C5029	SM661207103	SM.01uFS
C5030	SM661205822	SM.0082uFS
C5031	SM661207103	SM.01uFS
C5032	SM661207103	SM.01uFS
C5033	SM661207103	SM.01uFS
C5034	SM661207103	SM.01uFS
C5035	SM661207103	SM.01uFS
C5036	SM661207103	SM.01uFS
C5037	SM661207103	SM.01uFS
C5038	SM661207103	SM.01uFS
C5039	SM661207103	SM.01uFS
C5040	SM666327225	SM2.2uF-20V
C5041	SM661207103	SM.01uFS
C5042	SM661207103	SM.01uFS
C5043	SM661207103	SM.01uFS
C5044	SM661207103	SM.01uFS
C5045	SM661207104	SM.1uFS
C5046	SM661255821	SM820pFS
C5047	SM661207104	SM.1uFS
C5048	SM661255100	SM10pFS
C5049	SM666327225	SM2.2uF-20V
C5050	SM666327225	SM2.2uF-20V
C5051	SM661207103	SM.01uFS
C5052	SM661207103	SM.01uFS
C5053	SM666327225	SM2.2uF-20V
C5054	SM666327225	SM2.2uF-20V
C6000	SM661207104	SM.1uFS
C6001	SM661207104	SM.1uFS
C6003	SM666327225	SM2.2uF-20V
C6004	SM661207103	SM.01uFS
C6005	SM661207103	SM.01uFS
C6006	SM666327225	SM2.2uF-20V
F3000	SM433012001	SM.2A
F4000	SM433012001	SM.2A
J200	454110010	POWER1x10-M
J201	454115014	1x14-ST-M
J900	4543200963	32-ST-F
J901	454390002	1x2-ST-M-PL
J1000	7093XXP01	93XX-PROBE
J2000	7093XXP01	93XX-PROBE
J3000	7093XXP01	93XX-PROBE
J4000	7093XXP01	93XX-PROBE
J5000	7093XXP01	93XX-PROBE
J6000	7093XXP01	93XX-PROBE
L100	SM301502001	SMBEAD1206
L101	SM301502001	SMBEAD1206
L102	SM301502001	SMBEAD1206
L103	SM301502001	SMBEAD1206
L104	SM301502001	SMBEAD1206
L105	SM301502001	SMBEAD1206
L106	SM301502001	SMBEAD1206
L400	SM300446150	SM.015uH
L401	SM301502001	SMBEAD1206
L402	SM301502001	SMBEAD1206
L403	SM300546151	SM.15uH
L900	SM301502001	SMBEAD1206
L1000	SM300486104	SM100uH
L1001	SM301502001	SMBEAD1206
L1002	SM301502001	SMBEAD1206
L1003	SM301502001	SMBEAD1206
L1004	SM301502001	SMBEAD1206
L1005	SM301502001	SMBEAD1206
L1501	SM301502001	SMBEAD1206
L1502	SM301502001	SMBEAD1206
L1503	SM301502001	SMBEAD1206
L2000	SM300486104	SM100uH
L2001	SM301502001	SMBEAD1206
L2002	SM301502001	SMBEAD1206
L2003	SM301502001	SMBEAD1206
L2004	SM301502001	SMBEAD1206
L2005	SM301502001	SMBEAD1206
L2501	SM301502001	SMBEAD1206
L2502	SM301502001	SMBEAD1206

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
L2503	SM301502001	SMBEAD1206
L4000	SM301502001	SMBEAD1206
L4001	SM301502001	SMBEAD1206
L5000	SM301502001	SMBEAD1206
L5001	SM301502001	SMBEAD1206
L5002	SM301502001	SMBEAD1206
L5003	SM301502001	SMBEAD1206
L6000	SM301502001	SMBEAD1206
L6001	SM301502001	SMBEAD1206
Q200	SM270080054	BCX54
Q201	SM270080054	BCX54
Q202	SM270080054	BCX54
Q203	SM270080054	BCX54
Q204	SM270130092	BFR92A
Q205	SM270080054	BCX54
Q206	SM270080054	BCX54
Q207	SM270080054	BCX54
Q208	SM270080054	BCX54
Q209	SM270330848	BC848C
Q221	SM280171005	MTD10N05E
Q224	SM280171005	MTD10N05E
Q400	SM270160133	BFG33X
Q401	SM270160133	BFG33X
Q402	SM270160133	BFG33X
Q403	SM270330848	BC848C
Q404	SM270330848	BC848C
Q405	SM270330848	BC848C
Q406	SM270330848	BC848C
Q407	SM270030020	BFS20
Q408	SM270330848	BC848C
Q409	SM207130025	BFT25A
Q410	SM270130092	BFR92A
Q411	SM270330848	BC848C
Q412	SM270130092	BFR92A
Q413	SM275330858	BC858C
Q414	SM275330858	BC858C
Q415	SM270140092	BFR92AR
Q416	SM270330848	BC848C
Q417	SM270330848	BC848C
Q418	SM275330858	BC858C
Q419	SM275330858	BC858C
Q420	SM270330848	BC848C
Q421	SM270130092	BFR92A
Q900	SM280171005	MTD10N05E
Q1000	SM280124416	SST4416
Q1001	SM270130092	BFR92A
Q1002	SM270130092	BFR92A
Q1003	SM289240062	BCV62
Q1004	SM275040093	BFT93R
Q1005	SM275030093	BFT93
Q1006	SM270130092	BFR92A
Q1007	SM275330858	BC858C
Q1008	SM275030092	BFT92
Q1009	SM275030092	BFT92
Q1010	SM275030092	BFT92
Q1011	SM270130092	BFR92A
Q1012	SM270130092	BFR92A
Q1500	SM275330858	BC858C
Q1502	271211676	BD676
Q1503	SM270030020	BFS20
Q1504	SM270030020	BFS20
Q1505	SM270130092	BFR92A
Q1506	SM275330858	BC858C
Q1507	SM270330848	BC848C
Q1508	SM270130092	BFR92A
Q1509	SM280120309	SST309
Q1513	SM275330858	BC858C
Q1700	SM275330858	BC858C
Q2000	SM280124416	SST4416
Q2001	SM270130092	BFR92A
Q2002	SM270130092	BFR92A
Q2003	SM289240062	BCV62
Q2004	SM275040093	BFT93R
Q2005	SM275030093	BFT93
Q2006	SM270130092	BFR92A
Q2007	SM275330858	BC858C
Q2008	SM275030092	BFT92
Q2009	SM275030092	BFT92
Q2010	SM275030092	BFT92
Q2011	SM270130092	BFR92A
Q2012	SM270130092	BFR92A
Q2500	SM275330858	BC858C
Q2502	SM275330858	BC858C
Q2503	271211676	BD676
Q2504	SM280120309	SST309
Q2505	SM270030020	BFS20
Q2506	SM270030020	BFS20
Q2507	SM270130092	BFR92A
Q2508	SM275330858	BC858C
Q2509	SM270330848	BC848C

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
Q2510	SM270130092	BFR92A
Q2513	SM275330858	BC858C
Q3000	SM270160133	BFG33X
Q3001	SM270160133	BFG33X
Q3002	SM275030550	BF550
Q3003	SM275030550	BF550
Q3004	SM270160133	BFG33X
Q3005	SM275030550	BF550
Q3006	SM275030550	BF550
Q3007	SM270160133	BFG33X
Q3008	SM270330848	BC848C
Q4000	SM270160133	BFG33X
Q4001	SM270160133	BFG33X
Q4002	SM275030550	BF550
Q4003	SM275030550	BF550
Q4004	SM270160133	BFG33X
Q4005	SM275030550	BF550
Q4006	SM275030550	BF550
Q4007	SM270160133	BFG33X
Q4008	SM270330848	BC848C
Q5000	SM270130092	BFR92A
Q5001	SM280124416	SST4416
Q5002	SM270130093	BFR93A
Q6000	SM270130092	BFR92A
Q6001	SM275030550	BF550
Q6002	SM270130092	BFR92A
Q6003	SM270130092	BFR92A
Q6004	SM275030550	BF550
R100	SM652101103	SM10KS
R101	SM652101103	SM10KS
R102	SM652101103	SM10KS
R103	SM652101332	SM3.3KS
R104	SM652101103	SM10KS
R105	SM652101103	SM10KS
R106	SM652101152	SM1.5KS
R107	SM652101122	SM1.2KS
R108	SM652101153	SM15KS
R109	SM652101103	SM10KS
R110	SM652101103	SM10KS
R111	SM652101102	SM1KS
R112	SM652101332	SM3.3KS
R113	SM652101824	SM820KS
R114	SM652101103	SM10KS
R115	SM652101510	SM51S
R116	SM652101103	SM10KS
R117	SM168659007	SM3.0K-1/oo
R118	SM168659004	SM900-1/oo
R119	SM168659297	SM100-1/oo
R120	SM652101103	SM10KS
R123	SM652101301	SM300S
R124	SM652101151	SM150S
R125	SM652101301	SM300S
R126	SM652101151	SM150S
R200	SM652101103	SM10KS
R201	SM652101332	SM3.3KS
R202	SM652101392	SM3.9KS
R203	SM652101512	SM5.1KS
R204	SM652101102	SM1KS
R205	SM652101102	SM1KS
R206	SM652101183	SM18KS
R207	SM652101101	SM100S
R209	SM185457102	SM1K-1T
R211	SM652101912	SM9.1KS
R212	SM652101102	SM1KS
R213	SM652101104	SM100KS
R214	SM652101512	SM5.1KS
R216	SM652101471	SM470S
R218	SM652101471	SM470S
R220	SM652101272	SM2.7KS
R221	SM652101151	SM150S
R222	SM652101111	SM110S
R223	SM652101471	SM470S
R224	SM652101100	SM10S
R225	SM652101272	SM2.7KS
R227	SM652101680	SM68S
R228	SM652101221	SM220S
R229	SM652101102	SM1KS
R230	SM652101221	SM220S
R231	SM652101221	SM220S
R232	SM652101221	SM220S
R233	SM652101680	SM68S
R234	SM652101680	SM68S
R235	SM654101000	SM0S
R237	SM652101332	SM3.3KS
R238	SM652101202	SM2KS
R239	SM652101202	SM2KS
R240	SM652101201	SM200S
R241	SM652101201	SM200S
R242	SM652101222	SM2.2KS
R243	SM652101512	SM5.1KS

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
R244	SM652101332	M3.3KS
R245	SM652101202	SM2KS
R246	SM652101202	SM2KS
R247	SM652101512	SM5.1KS
R248	SM652101332	SM3.3KS
R249	SM652101202	SM2KS
R250	SM652101202	SM2KS
R251	SM652101512	SM5.1KS
R252	SM652101121	SM120S
R253	SM652101750	SM75S
R255	SM652101332	SM3.3KS
R256	SM652101202	SM2KS
R257	SM652101202	SM2KS
R258	SM652101201	SM200S
R259	SM653181101	SM1
R260	SM652101750	SM75S
R261	SM652101332	SM3.3KS
R262	SM652101202	SM2KS
R263	SM652101202	SM2KS
R264	SM653181101	SM1
R265	SM652101102	SM1KS
R266	SM652101121	SM120S
R267	SM652101201	SM200S
R269	SM652101102	SM1KS
R270	SM652101331	SM330S
R271	SM652101680	SM68S
R272	SM652101680	SM68S
R273	SM652101272	SM2.7KS
R274	SM652101101	SM100S
R275	SM652101102	SM1KS
R276	SM652101680	SM68S
R277	SM652101680	SM68S
R278	161665100	10-2W
R279	SM652101122	SM1.2KS
R280	SM652101201	SM200S
R281	SM652101122	SM1.2KS
R282	SM652101102	SM1KS
R283	SM652101821	SM820S
R284	SM652101241	SM240S
R285	SM652101111	SM110S
R286	SM652101151	SM150S
R287	SM652101151	SM150S
R288	SM652101471	SM470S
R289	SM652101241	SM240S
R290	SM653181101	SM1
R291	SM652101100	SM10S
R292	SM652101471	SM470S
R293	161665100	10-2W
R294	SM652101100	SM10S
R295	SM652101510	SM51S
R296	SM652101202	SM2KS
R297	SM652101102	SM1KS
R298	SM652101151	SM150S
R299	SM185457103	SM10K-1T
R300	SM652101102	SM1KS
R301	SM652101102	SM1KS
R302	SM652101102	SM1KS
R303	SM652101182	SM1.8KS
R304	SM652101132	SM1.3KS
R305	SM652101301	SM300S
R306	SM652101561	SM560S
R307	SM652101111	SM110S
R308	SM652101100	SM10S
R309	SM653181101	SM1
R310	SM652101510	SM51S
R336	SM652101132	SM1.3KS
R400	SM652101271	SM270S
R401	SM652101680	SM68S
R402	SM652101271	SM270S
R403	SM652101271	SM270S
R404	SM652101271	SM270S
R405	SM652101680	SM68S
R406	SM652101271	SM270S
R407	SM652101271	SM270S
R408	SM652101512	SM5.1KS
R409	SM652101471	SM470S
R410	SM652101471	SM470S
R411	SM652101562	SM5.6KS
R412	SM652101562	SM5.6KS
R413	SM652101562	SM5.6KS
R414	SM652101512	SM5.1KS
R415	SM652101512	SM5.1KS
R416	SM652101271	SM270S
R417	SM652101471	SM470S
R418	SM652101271	SM270S
R419	SM652101471	SM470S
R420	SM652101471	SM470S
R421	SM652101471	SM470S
R422	SM652101471	SM470S
R423	SM652101471	SM470S

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
R424	SM652101471	SM470S
R425	SM652101471	SM470S
R426	SM652101471	SM470S
R427	SM652101471	SM470S
R428	SM652101512	SM5.1KS
R429	SM652101471	SM470S
R430	SM652101471	SM470S
R431	SM652101391	SM390S
R432	SM652101562	SM5.6KS
R433	SM652101471	SM470S
R434	SM652101512	SM5.1KS
R435	SM652101512	SM5.1KS
R436	SM652101562	SM5.6KS
R437	SM652101302	SM3KS
R438	SM652101512	SM5.1KS
R439	SM652101512	SM5.1KS
R440	SM652101562	SM5.6KS
R441	SM652101471	SM470S
R442	SM652101562	SM5.6KS
R443	SM652101562	SM5.6KS
R444	SM652101391	SM390S
R445	SM652101820	SM82S
R446	SM652101471	SM470S
R447	SM652101471	SM470S
R448	SM652101121	SM120S
R449	SM652101151	SM150S
R450	SM652101391	SM390S
R451	SM652101181	SM180S
R452	SM652101181	SM180S
R453	SM652101151	SM150S
R454	SM652101101	SM100S
R455	SM652101181	SM180S
R456	SM652101151	SM150S
R457	SM652101101	SM100S
R458	SM652101181	SM180S
R459	SM652101390	SM39S
R460	SM652101471	SM470S
R461	SM652101560	SM56S
R462	SM652101560	SM56S
R463	SM652101181	SM180S
R465	SM652101103	SM10KS
R466	SM652101103	SM10KS
R467	SM652101102	SM1KS
R468	SM652101181	SM180S
R469	SM652101560	SM56S
R470	SM652101181	SM180S
R471	SM652101680	SM68S
R472	SM652101181	SM180S
R473	SM652101560	SM56S
R474	SM652101560	SM56S
R475	SM654101000	SM0S
R476	SM652101221	SM220S
R477	SM652101103	SM10KS
R478	SM652101560	SM56S
R479	SM652101560	SM56S
R480	SM652101181	SM180S
R481	SM652101560	SM56S
R482	SM652101560	SM56S
R483	SM654101000	SM0S
R484	SM652101751	SM750S
R485	SM652101560	SM56S
R486	SM652101181	SM180S
R487	SM652101331	SM330S
R488	SM652101221	SM220S
R489	SM652101101	SM100S
R490	SM652101220	SM22S
R491	SM652101122	SM1.2KS
R492	SM652101102	SM1KS
R493	SM652101101	SM100S
R494	SM652101751	SM750S
R495	SM652101471	SM470S
R496	SM652101103	SM10KS
R497	SM652101240	SM24S
R498	SM652101181	SM180S
R499	SM652101181	SM180S
R500	SM652101331	SM330S
R501	SM652101181	SM180S
R502	SM652101471	SM470S
R503	SM652101471	SM470S
R504	SM652101181	SM180S
R505	SM652101471	SM470S
R506	SM652101222	SM2.2KS
R507	SM652101221	SM220S
R508	SM652101331	SM330S
R509	SM652101471	SM470S
R510	SM652101471	SM470S
R511	SM652101151	SM150S
R512	SM652101241	SM240S
R513	SM652101151	SM150S
R514	SM652101151	SM150S

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
R515	SM652101104	SM100KS
R516	SM652101101	SM100S
R517	SM652101101	SM100S
R518	SM652101680	SM68S
R519	SM652101680	SM68S
R520	SM652101680	SM68S
R521	SM652101222	SM2.2KS
R522	SM652101680	SM68S
R523	SM652101750	SM75S
R524	SM652101750	SM75S
R525	SM652101680	SM68S
R526	SM652101680	SM68S
R527	SM652101221	SM220S
R528	SM652101221	SM220S
R529	SM652101751	SM750S
R530	SM652101151	SM150S
R531	SM652101221	SM220S
R532	SM652101221	SM220S
R533	SM652101151	SM150S
R534	SM652101471	SM470S
R535	SM652101471	SM470S
R536	SM652101510	SM51S
R537	SM652101562	SM5.6KS
R538	SM652101471	SM470S
R539	SM652101101	SM100S
R540	SM652101510	SM51S
R541	SM652101103	SM10KS
R542	SM652101101	SM100S
R543	SM652101510	SM51S
R544	SM652101101	SM100S
R545	SM652101151	SM150S
R546	SM652101510	SM51S
R547	SM652101101	M100S
R548	SM652101510	SM51S
R549	SM652101101	SM100S
R550	SM652101512	SM5.1KS
R551	SM652101222	SM2.2KS
R552	SM652101101	SM100S
R553	SM652101103	SM10KS
R554	SM652101101	SM100S
R555	SM652101751	SM750S
R556	SM652101151	SM150S
R557	SM652101241	SM240S
R558	SM652101121	SM120S
R559	SM652101152	SM1.5KS
R560	SM652101751	SM750S
R561	SM652101241	SM240S
R562	SM652101332	SM3.3KS
R563	SM652101152	SM1.5KS
R564	SM651104241	SM240-25PPM
R565	SM652101152	SM1.5KS
R566	SM652101222	SM2.2KS
R567	SM652101510	SM51S
R568	SM652101122	SM1.2KS
R569	SM652101151	SM150S
R570	SM652101153	SM15KS
R571	SM651104472	SM4.7K-25PPM
R572	SM651104182	SM1.8K-25PPM
R573	SM651104392	SM3.9K-25PPM
R574	SM651104182	SM1.8K-25PPM
R575	SM651104204	SM200K-25PPM
R576	SM652101512	SM5.1KS
R577	SM651104153	SM15K-25PPM
R578	SM651104203	SM20K-25PPM
R579	SM651104202	SM2K-25PPM
R580	SM651104391	SM390-25PPM
R581	SM185457201	SM200-1T
R582	SM652101512	SM5.1KS
R583	SM652101103	SM10KS
R584	SM652101203	SM20KS
R585	SM652101103	SM10KS
R586	SM652101512	SM5.1KS
R587	SM652101103	SM10KS
R588	SM652101750	SM75S
R589	SM652101201	SM200S
R590	SM652101201	SM200S
R591	SM652101241	SM240S
R592	SM654101000	SM0S
R593	SM652101680	SM68S
R594	SM652101471	SM470S
R597	SM652101391	SM390S
R601	SM652101680	SM68S
R602	SM652101151	SM150S
R603	SM652101241	SM240S
R604	SM652101121	SM120S
R605	SM652101151	SM150S
R606	SM652101121	SM120S
R607	SM652101510	SM51S
R608	SM652101101	SM100S
R609	SM652101151	SM150S

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
R610	SM652101202	SM2KS
R611	SM652101202	SM2KS
R612	SM652101680	SM68S
R613	SM654101000	SM0S
R614	SM652101680	SM68S
R615	SM652101331	SM330S
R900	SM652101101	SM100S
R901	169416473	NTC-DISC-47K
R902	SM652101223	SM22KS
R903	SM652101103	SM10KS
R906	SM652101122	SM1.2KS
R908	SM652101100	SM10S
R910	SM652101302	SM3KS
R913	SM654101000	SM0S
R914	SM652101103	SM10KS
R915	SM652101102	SM1KS
R917	SM652101220	SM22S
R918	SM652101220	SM22S
R919	SM652101220	SM22S
R920	SM652101102	SM1KS
R921	SM652101680	SM68S
R922	SM652101680	SM68S
R923	SM652101680	SM68S
R924	SM652101512	SM5.1KS
R925	SM652101103	SM10KS
R926	SM652101103	SM10KS
R928	SM652101103	SM10KS
R929	SM652101103	SM10KS
R930	SM652101103	SM10KS
R931	SM652101224	SM220KS
R932	SM652101513	SM51KS
R933	SM652101475	SM4.7MS
R935	SM652101185	SM1.8MS
R936	SM652101334	SM330KS
R939	SM652101114	SM110KS
R940	SM652101683	SM68KS
R941	SM652101103	SM10KS
R945	SM652101185	SM1.8MS
R946	SM652101103	SM10KS
R949	SM652101101	SM100S
R950	SM652101332	SM3.3KS
R951	SM652101332	SM3.3KS
R952	SM652101332	SM3.3KS
R953	SM652101332	SM3.3KS
R954	SM652101332	SM3.3KS
R955	SM652101332	SM3.3KS
R956	SM652101101	SM100S
R957	SM652101224	SM220KS
R980	SM652101222	SM2.2KS
R1000	SM652101330	SM33S
R1001	SM652101301	SM300S
R1002	SM652101392	SM3.9KS
R1003	SM652101105	SM1MS
R1004	SM652101332	SM3.3KS
R1005	SM652113954	SM950K-3/oo
R1006	SM652101181	SM180S
R1007	SM168651297	SM100-1%MM'
R1008	SM652101822	SM8.2KS
R1009	SM652101683	SM68KS
R1010	SM185457203	SM20K-1T
R1011	SM652101101	SM100S
R1012	SM652101360	SM36S
R1013	SM652101220	SM22S
R1014	SM168651297	SM100-1%MM'
R1016	SM652113523	SM52.63K-3/oo
R1017	SM652101101	SM100S
R1018	SM652101114	SM110KS
R1019	SM652110904	SM900K-5/oo
R1020	SM652101272	SM2.7KS
R1021	SM652101512	SM5.1KS
R1022	SM652101101	SM100S
R1023	SM652101475	SM4.7MS
R1024	SM652101122	SM1.2KS
R1025	SM652101221	SM220S
R1026	SM652101105	SM1MS
R1027	SM652101105	SM1MS
R1028	SM652101220	SM22S
R1029	SM652101151	SM150S
R1030	SM652101512	SM5.1KS
R1031	SM652101512	SM5.1KS
R1032	SM652101220	SM22S
R1033	SM652101185	SM1.8MS
R1034	SM652101334	SM330KS
R1035	SM652101101	SM100S
R1036	SM652101333	SM33KS
R1037	SM652101103	SM10KS
R1038	SM652101330	SM33S
R1039	SM652101511	SM510S
R1040	SM652101101	SM100S
R1041	SM185457103	SM10K-1T

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
R1042	SM652101103	SM10KS
R1043	SM652101913	SM91KS
R1044	SM652101100	SM10S
R1045	SM652101100	SM10S
R1046	SM652101100	SM10S
R1047	SM652101182	SM1.8KS
R1048	SM652101163	SM16KS
R1049	SM652101122	SM1.2KS
R1050	SM652101101	SM100S
R1051	SM652101240	SM24S
R1052	SM652101240	SM24S
R1053	SM652101101	SM100S
R1054	SM652101223	SM22KS
R1055	SM652101240	SM24S
R1056	SM652101510	SM51S
R1057	SM652101100	SM10S
R1058	SM652101100	SM10S
R1059	SM652101822	SM8.2KS
R1060	SM652101471	SM470S
R1061	SM652101471	SM470S
R1062	SM652101152	SM1.5KS
R1063	SM652101101	SM100S
R1064	SM652101750	SM75S
R1065	SM652101330	SM33S
R1066	SM652101301	SM300S
R1067	SM652101101	SM100S
R1068	SM652101302	SM3KS
R1069	SM652101152	SM1.5KS
R1070	SM652101202	SM2KS
R1071	SM652101103	SM10KS
R1072	SM652101391	SM390S
R1073	SM652101560	SM56S
R1074	SM652101560	SM56S
R1075	SM652101560	SM56S
R1076	SM652101562	SM5.6KS
R1077	SM652101152	SM1.5KS
R1078	SM652101221	SM220S
R1079	SM185457203	SM20K-1T
R1080	SM652101103	SM10KS
R1081	SM652101103	SM10KS
R1082	SM652101103	SM10KS
R1083	SM652101221	SM220S
R1084	SM652101105	SM1MS
R1085	SM652101103	SM10KS
R1086	SM652101105	SM1MS
R1087	SM652101390	SM39S
R1088	SM653185390	SM39
R1089	SM652101470	SM47S
R1091	SM652101470	SM47S
R1092	SM652101220	SM22S
R1502	SM652101105	SM1MS
R1503	SM652101512	SM5.1KS
R1504	SM652101181	SM180S
R1505	SM652101181	SM180S
R1506	SM652101202	SM2KS
R1507	SM652101105	SM1MS
R1508	SM652101102	SM1KS
R1509	SM652101512	SM5.1KS
R1511	SM652101680	SM68S
R1512	SM652101752	SM7.5KS
R1513	SM652101512	SM5.1KS
R1514	SM652101103	SM10KS
R1515	SM652101203	SM20KS
R1516	SM185457202	SM2K-1T
R1519	SM652101510	SM51S
R1520	SM652101680	SM68S
R1521	SM652101510	SM51S
R1522	SM652101510	SM51S
R1523	SM652101562	SM5.6KS
R1524	SM652101510	SM51S
R1525	SM652101512	SM5.1KS
R1526	SM652101512	SM5.1KS
R1527	SM652101153	SM15KS
R1529	SM652101103	SM10KS
R1530	SM652101103	SM10KS
R1532	SM652101153	SM15KS
R1534	SM185457102	SM1K-1T
R1535	SM652101360	SM36S
R1536	SM652101103	SM10KS
R1539	SM652101102	SM1KS
R1540	SM652101680	SM68S
R1541	SM652101680	SM68S
R1542	SM652101102	SM1KS
R1543	SM652101203	SM20KS
R1545	SM652101332	SM3.3KS
R1546	SM652101390	SM39S
R1549	SM652101680	SM68S
R1550	SM652101203	SM20KS
R1551	SM652101102	SM1KS
R1552	SM652101680	SM68S

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
R1553	SM652101102	SM1KS
R1554	SM652101271	SM270S
R1555	SM652101271	SM270S
R1556	SM652101680	SM68S
R1557	SM652101132	SM1.3KS
R1558	SM652101680	SM68S
R1559	SM652101680	SM68S
R1560	SM652101680	SM68S
R1561	SM652101680	SM68S
R1562	SM652101680	SM68S
R1563	SM652101680	SM68S
R1565	SM654101000	SM0S
R1566	SM652101102	SM1KS
R1567	SM652101102	SM1KS
R1568	SM652101102	SM1KS
R1569	SM652101103	SM10KS
R1570	SM652101113	SM11KS
R1572	SM652101202	SM2KS
R1573	SM652101104	SM100KS
R1574	SM652101104	SM100KS
R1575	SM185457103	SM10K-1T
R1576	SM652101223	SM22KS
R1577	SM652101223	SM22KS
R1578	SM652101271	SM270S
R1579	SM652101182	SM1.8KS
R1580	SM652101240	SM24S
R1581	SM652101360	SM36S
R1582	SM652101821	SM820S
R1583	SM652101102	SM1KS
R1584	SM652101104	SM100KS
R1585	SM185457103	SM10K-1T
R1586	SM652101821	SM820S
R1587	SM652101820	SM82S
R1588	SM652101101	SM100S
R1589	SM652101103	SM10KS
R1590	SM652101183	SM18KS
R1591	SM652101103	SM10KS
R1592	SM652101122	SM1.2KS
R1593	SM652101390	SM39S
R1594	SM652101100	SM10S
R1595	SM652101100	SM10S
R1596	SM652101510	SM51S
R1597	SM652101510	SM51S
R1598	SM652101183	SM18KS
R1599	SM652101101	SM100S
R1600	SM652101681	SM680S
R1601	SM652101393	SM39KS
R1602	SM652101151	SM150S
R1603	SM652101390	SM39S
R1604	SM652101680	SM68S
R1605	SM652101223	SM22KS
R1606	SM652101223	SM22KS
R1607	SM652101331	SM330S
R1608	SM652101104	SM100KS
R1609	SM652101104	SM100KS
R1610	SM652101680	SM68S
R1611	SM652101273	SM27KS
R1612	SM652101363	SM36KS
R1613	SM185457103	SM10K-1T
R1614	SM652101273	SM27KS
R1615	SM652101104	SM100KS
R1616	SM652101471	SM470S
R1617	SM652101471	SM470S
R1618	SM652101471	SM470S
R1619	SM652101471	SM470S
R1620	SM652101471	SM470S
R1621	SM652101471	SM470S
R1622	SM652101471	SM470S
R1623	SM652101471	SM470S
R1625	SM652101202	SM2KS
R1626	SM652101202	SM2KS
R1627	SM652101151	SM150S
R1630	SM652101241	SM240S
R2000	SM652101330	SM33S
R2001	SM652101301	SM300S
R2002	SM652101392	SM3.9KS
R2003	SM652101105	SM1MS
R2004	SM652101332	SM3.3KS
R2005	SM652113954	SM950K-3/oo
R2006	SM652101181	SM180S
R2007	SM168651297	SM100-1%MM'
R2008	SM652101822	SM8.2KS
R2009	SM652101683	SM68KS
R2010	SM185457203	SM20K-1T
R2011	SM652101101	SM100S
R2012	SM652101360	SM36S
R2013	SM652101220	SM22S
R2014	SM168651297	SM100-1%MM'
R2016	SM652113523	SM52.63K-3/oo
R2017	SM652101101	SM100S

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
R2018	SM652101114	SM110KS
R2019	SM652110904	SM900K-5/oo
R2020	SM652101272	SM2.7KS
R2021	SM652101512	SM5.1KS
R2022	SM652101101	SM100S
R2023	SM652101475	SM4.7MS
R2024	SM652101122	SM1.2KS
R2025	SM652101221	SM220S
R2026	SM652101105	SM1MS
R2027	SM652101105	SM1MS
R2028	SM652101220	SM22S
R2029	SM652101151	SM150S
R2030	SM652101512	SM5.1KS
R2031	SM652101512	SM5.1KS
R2032	SM652101220	SM22S
R2033	SM652101185	SM1.8MS
R2034	SM652101334	SM330KS
R2035	SM652101101	SM100S
R2036	SM652101333	SM33KS
R2037	SM652101103	SM10KS
R2038	SM652101330	SM33S
R2039	SM652101511	SM510S
R2040	SM652101101	SM100S
R2041	SM185457103	SM10K-1T
R2042	SM652101103	SM10KS
R2043	SM652101913	SM91KS
R2044	SM652101100	SM10S
R2045	SM652101100	SM10S
R2046	SM652101100	SM10S
R2047	SM652101182	SM1.8KS
R2048	SM652101163	SM16KS
R2049	SM652101122	SM1.2KS
R2050	SM652101101	SM100S
R2051	SM652101240	SM24S
R2052	SM652101240	SM24S
R2053	SM652101101	SM100S
R2054	SM652101223	SM22KS
R2055	SM652101240	SM24S
R2056	SM652101510	SM51S
R2057	SM652101100	SM10S
R2058	SM652101100	SM10S
R2059	SM652101822	SM8.2KS
R2060	SM652101471	SM470S
R2061	SM652101471	SM470S
R2062	SM652101152	SM1.5KS
R2063	SM652101101	SM100S
R2064	SM652101750	SM75S
R2065	SM652101330	SM33S
R2066	SM652101301	SM300S
R2067	SM652101101	SM100S
R2068	SM652101302	SM3KS
R2069	SM652101152	SM1.5KS
R2070	SM652101202	SM2KS
R2071	SM652101103	SM10KS
R2072	SM652101391	SM390S
R2073	SM652101560	SM56S
R2074	SM652101560	SM56S
R2075	SM652101560	SM56S
R2076	SM652101562	SM5.6KS
R2077	SM652101152	SM1.5KS
R2078	SM652101221	SM220S
R2079	SM185457203	SM20K-1T
R2080	SM652101103	SM10KS
R2081	SM652101103	SM10KS
R2082	SM652101103	SM10KS
R2083	SM652101221	SM220S
R2084	SM652101105	SM1MS
R2085	SM652101103	SM10KS
R2086	SM652101105	SM1MS
R2087	SM652101390	SM39S
R2088	SM653185390	SM39
R2092	SM652101220	SM22S
R2502	SM652101202	SM2KS
R2504	SM652101105	SM1MS
R2505	SM652101680	SM68S
R2506	SM652101510	SM51S
R2509	SM652101510	SM51S
R2510	SM652101680	SM68S
R2511	SM652101510	SM51S
R2512	SM652101510	SM51S
R2513	SM652101562	SM5.6KS
R2514	SM652101752	SM7.5KS
R2515	SM652101512	SM5.1KS
R2516	SM652101153	SM15KS
R2517	SM652101105	SM1MS
R2518	SM652101102	SM1KS
R2519	SM652101103	SM10KS
R2521	SM652101102	SM1KS
R2522	SM652101512	SM5.1KS
R2523	SM652101103	SM10KS

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
R2524	SM652101512	SM5.1KS
R2525	SM185457102	SM1K-1T
R2526	SM652101360	SM36S
R2527	SM652101103	SM10KS
R2530	SM652101102	SM1KS
R2531	SM652101512	SM5.1KS
R2532	SM652101512	SM5.1KS
R2533	SM652101203	SM20KS
R2534	SM185457202	SM2K-1T
R2535	SM652101390	SM39S
R2538	SM652101680	SM68S
R2539	SM652101203	SM20KS
R2540	SM652101103	SM10KS
R2541	SM652101153	SM15KS
R2542	SM652101680	SM68S
R2543	SM652101102	SM1KS
R2545	SM652101271	SM270S
R2546	SM652101203	SM20KS
R2548	SM652101271	SM270S
R2549	SM652101132	SM1.3KS
R2550	SM652101680	SM68S
R2551	SM652101102	SM1KS
R2552	SM652101332	SM3.3KS
R2553	SM652101471	SM470S
R2554	SM652101680	SM68S
R2555	SM652101471	SM470S
R2556	SM652101680	SM68S
R2558	SM654101000	SM0S
R2559	SM652101102	SM1KS
R2560	SM652101102	SM1KS
R2561	SM652101102	SM1KS
R2562	SM652101103	SM10KS
R2563	SM652101113	SM11KS
R2565	SM652101202	SM2KS
R2566	SM652101104	SM100KS
R2567	SM652101104	SM100KS
R2569	SM652101223	SM22KS
R2570	SM652101223	SM22KS
R2571	SM652101271	SM270S
R2572	SM185457103	SM10K-1T
R2573	SM652101182	SM1.8KS
R2574	SM652101240	SM24S
R2575	SM652101360	SM36S
R2576	SM652101821	SM820S
R2577	SM652101102	SM1KS
R2578	SM652101104	SM100KS
R2579	SM185457103	SM10K-1T
R2580	SM652101821	SM820S
R2581	SM652101820	SM82S
R2582	SM652101101	SM100S
R2583	SM652101103	SM10KS
R2584	SM652101183	SM18KS
R2585	SM652101103	SM10KS
R2586	SM652101122	SM1.2KS
R2587	SM652101390	SM39S
R2588	SM652101100	SM10S
R2589	SM652101100	SM10S
R2590	SM652101510	SM51S
R2591	SM652101510	SM51S
R2592	SM652101183	SM18KS
R2593	SM652101681	SM680S
R2594	SM652101393	SM39KS
R2595	SM652101151	SM150S
R2596	SM652101390	SM39S
R2597	SM652101223	SM22KS
R2598	SM652101223	SM22KS
R2599	SM652101331	SM330S
R2600	SM652101104	SM100KS
R2601	SM652101104	SM100KS
R2602	SM652101273	SM27KS
R2603	SM652101363	SM36KS
R2604	SM185457103	SM10K-1T
R2605	SM652101273	SM27KS
R2606	SM652101104	SM100KS
R2607	SM652101471	SM470S
R2608	SM652101471	SM470S
R2609	SM652101471	SM470S
R2610	SM652101471	SM470S
R2611	SM652101471	SM470S
R2612	SM652101471	SM470S
R2613	SM652101471	SM470S
R2614	SM652101471	SM470S
R2625	SM652101202	SM2KS
R2626	SM652101202	SM2KS
R2627	SM652101151	SM150S
R2630	SM652101241	SM240S
R2703	SM652101101	SM100S
R2718	SM652101102	SM1KS
R3000	SM652101330	SM33S
R3001	SM652101330	SM33S

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
R3002	SM652101220	SM22S
R3003	SM652101271	SM270S
R3004	SM120-1%	SM120-1%MM'
R3005	SM120-1%	SM120-1%MM'
R3006	SM120-1%	SM120-1%MM'
R3007	SM120-1%	SM120-1%MM'
R3008	SM652101102	SM1KS
R3009	SM652101330	SM33S
R3010	SM652101102	SM1KS
R3011	SM652101203	SM20KS
R3012	SM652101510	SM51S
R3013	SM652101750	SM75S
R3014	SM652101301	SM300S
R3015	SM652101103	SM10KS
R3016	SM652101122	SM1.2KS
R3017	SM652101102	SM1KS
R3018	SM652101101	SM100S
R3019	SM652101100	SM10S
R3020	SM652101431	SM430S
R3021	SM652101330	SM33S
R3022	SM652101101	SM100S
R3023	SM652101330	SM33S
R3024	SM185457103	SM10K-1T
R3025	SM652101101	SM100S
R3026	SM652101680	SM68S
R3027	SM652101330	SM33S
R3028	SM652101330	SM33S
R3029	SM652101151	SM150S
R3030	SM652101100	SM10S
R3031	SM652101240	SM24S
R3032	SM652101222	SM2.2KS
R3033	SM652101680	SM68S
R3034	SM652101101	SM100S
R3035	SM652101151	SM150S
R3036	SM652101102	SM1KS
R3037	SM652101751	SM750S
R3038	SM652101221	SM220S
R3039	SM652101330	SM33S
R3040	SM652101912	SM9.1KS
R3041	SM652101203	SM20KS
R3042	SM652101101	SM100S
R3043	SM652101103	SM10KS
R3044	SM652101102	SM1KS
R3045	SM185457201	SM200-1T
R3046	SM652101102	SM1KS

Location	Part Number	Description
R3047	SM652101101	SM100S
R3049	SM652101202	SM2KS
R3050	SM652101102	SM1KS
R3051	SM652101102	SM1KS
R3052	SM652101202	SM2KS
R3053	SM652101102	SM1KS
R3060	SM652101101	M100S
R3061	SM652101332	M3.3KS
R3062	SM652101332	M3.3KS
R3063	SM652101510	SM51S
R4000	SM652101330	SM33S
R4001	SM652101330	SM33S
R4002	SM652101220	SM22S
R4003	SM652101271	M270S
R4004	M120-1%	M120-1%MM'
R4005	M120-1%	M120-1%MM'
R4006	M120-1%	M120-1%MM'
R4007	M120-1%	SM120-1%MM'
R4008	M652101102	SM1KS
R4009	M652101330	SM33S
R4010	M652101102	SM1KS
R4011	M652101203	SM20KS
R4012	M652101510	SM51S
R4013	M652101750	SM75S
R4014	M652101301	SM300S
R4015	M652101103	SM10KS
R4016	M652101122	SM1.2KS
R4017	M652101102	SM1KS
R4018	SM652101101	SM100S
R4019	SM652101100	SM10S
R4020	SM652101431	SM430S
R4021	SM652101330	SM33S
R4022	SM652101101	SM100S
R4023	SM652101330	SM33S
R4024	SM185457103	SM10K-1T
R4025	SM652101101	SM100S
R4026	SM652101680	SM68S
R4027	SM652101330	SM33S
R4028	SM652101330	SM33S
R4029	SM652101151	SM150S
R4030	SM652101100	SM10S
R4031	SM652101240	SM24S
R4032	SM652101222	SM2.2KS
R4033	SM652101680	SM68S
R4034	SM652101101	SM100S

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
R4035	SM652101151	SM150S
R4036	SM652101102	SM1KS
R4037	SM652101751	SM750S
R4038	SM652101221	SM220S
R4039	SM652101330	SM33S
R4040	SM652101912	SM9.1KS
R4041	SM652101203	SM20KS
R4042	SM652101101	SM100S
R4043	SM652101103	SM10KS
R4044	SM652101102	SM1KS
R4045	SM185457201	SM200-1T
R4046	SM652101102	SM1KS
R4047	SM652101101	SM100S
R4049	SM652101680	SM68S
R4050	SM652101680	SM68S
R4051	SM652101202	SM2KS
R4052	SM652101102	SM1KS
R4053	SM652101102	SM1KS
R4054	SM652101202	SM2KS
R4055	SM652101680	SM68S
R4056	SM652101102	SM1KS
R4057	SM652101680	SM68S
R4058	SM652101680	SM68S
R4059	SM652101680	SM68S
R4060	SM652101101	SM100S
R4061	SM652101332	SM3.3KS
R4062	SM652101332	SM3.3KS
R4063	SM652101510	SM51S
R5000	SM652101680	SM68S
R5001	SM652101330	SM33S
R5002	SM652101202	SM2KS
R5003	SM652101680	SM68S
R5004	SM652101330	SM33S
R5005	SM652101104	SM100KS
R5006	SM652110904	SM900K-5/oo
R5007	SM652101822	SM8.2KS
R5008	SM652101272	SM2.7KS
R5009	SM652101391	SM390S
R5010	SM652110904	SM900K-5/oo
R5011	SM652101510	SM51S
R5012	SM652101122	SM1.2KS
R5013	SM652101221	SM220S
R5014	SM652101475	SM4.7MS
R5015	SM168659006	SM111.1K-1/oo
R5016	SM652101104	SM100KS
R5017	SM652101151	SM150S
R5018	SM654101000	SM0S
R5019	SM652101100	SM10S
R5020	SM652101220	SM22S
R5021	SM652101103	SM10KS
R5022	SM652101510	SM51S
R5023	SM652110904	SM900K-5/oo
R5024	SM652101680	SM68S
R5025	SM652101510	SM51S
R5026	SM652101100	SM10S
R5027	SM652101391	SM390S
R5028	SM652101100	SM10S
R5029	SM652101680	SM68S
R5030	SM652101222	SM2.2KS
R5032	SM652101222	SM2.2KS
R5034	SM652101750	SM75S
R5035	SM652101750	SM75S
R5036	SM652101391	SM390S
R5037	SM652101750	SM75S
R5038	SM652101750	SM75S
R5039	SM652101391	SM390S
R5040	SM652101332	SM3.3KS
R5041	SM652101391	SM390S
R5042	SM652101332	SM3.3KS
R5043	SM652101163	SM16KS
R5044	SM652101332	SM3.3KS
R5045	SM652101391	SM390S
R5046	SM652101332	SM3.3KS
R5047	SM652101163	SM16KS
R5048	SM185457203	SM20K-1T
R5049	SM185457203	SM20K-1T
R5050	SM652101561	SM560S
R5051	SM652101561	SM560S
R5052	SM652101512	SM5.1KS
R5053	SM652101512	SM5.1KS
R5054	SM652101474	SM470KS
R5055	SM652101824	SM820KS
R5056	SM652101684	SM680KS
R5057	SM652101181	SM180S
R5058	SM652101153	SM15KS
R5059	SM652101222	SM2.2KS
R5060	SM652101222	SM2.2KS
R5061	SM652101222	SM2.2KS
R5062	SM652101153	SM15KS
R5063	SM652101680	SM68S

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description
R6000	SM652101330	SM33S
R6001	SM168659007	SM3.0K-1/oo
R6002	SM168659297	SM100-1/oo
R6003	SM168659297	SM100-1/oo
R6004	SM652101331	SM330S
R6005	SM652101220	SM22S
R6006	SM652101112	SM1.1KS
R6007	SM652101330	SM33S
R6008	SM652101181	SM180S
R6009	SM652101112	SM1.1KS
R6010	SM652101511	SM510S
R6011	SM652101512	SM5.1KS
R6012	SM652101512	SM5.1KS
R6013	SM652101131	SM130S
R6014	SM652101391	SM390S
R6015	SM168659007	SM3.0K-1/oo
R6016	SM168659007	SM3.0K-1/oo
R6017	SM168659004	SM900-1/oo
R6018	SM168659297	SM100-1/oo
R6019	SM652101392	SM3.9KS
R6020	SM652101112	SM1.1KS
R6021	SM168659007	SM3.0K-1/oo
S900	SM654101000	SM0S-2P
Y400	310100833	SAW833MHz
Y401	310062100	100MHZ
BZ900	530040006	HMB-06
CR100	SM240218475	BZX84-C7V5
CR101	SM240218475	BZX84-C7V5
CR102	SM240218451	BZX84-C5V1
CR200	SM236030099	BAV99
CR201	SM236030099	BAV99
CR202	208590336	LM336-2.5
CR203	SM236030099	BAV99
CR400	SM236654004	SM4004
CR401	SM236654004	SM4004
CR402	SM252080682	BA682
CR403	SM252080682	BA682
CR404	SM252080682	BA682
CR405	SM252080682	BA682
CR406	SM252080682	BA682
CR900	SM236030099	BAV99
CR1000	SM229020150	SMTVSS-5V6
CR1001	SM236030099	BAV99
CR1002	SM236030099	BAV99
CR1003	SM236030099	BAV99
CR1004	SM252023018	BAT18
CR1005	SM240050051	TZMC5V1
CR1500	SM236030099	BAV99
CR1501	SM236030099	BAV99
CR1502	SM232022822	HSMS2822
CR1503	SM232022822	HSMS2822
CR1504	SM232022822	HSMS2822
CR1700	SM240218462	BZX84-C6V2
CR2000	SM229020150	SMTVSS-5V6
CR2001	SM236030099	BAV99
CR2002	SM236030099	BAV99
CR2003	SM236030099	BAV99
CR2004	SM252023018	BAT18
CR2005	SM240050051	TZMC5V1
CR2500	SM240218462	BZX84-C6V2
CR2501	SM236030099	BAV99
CR2502	SM236030099	BAV99
CR2503	SM232022822	HSMS2822
CR2504	SM232022822	HSMS2822
CR2505	SM232022822	HSMS2822
CR3000	SM229020150	SMTVSS-5V6
CR3001	SM236030099	BAV99
CR3002	SM236030099	BAV99
CR3003	SM232022822	HSMS2822
CR3004	SM236030099	BAV99
CR3005	SM232022822	HSMS2822
CR3006	SM236030099	BAV99
CR3007	SM236030099	BAV99
CR4000	SM229020150	SMTVSS-5V6
CR4001	SM236030099	BAV99
CR4002	SM236030099	BAV99
CR4003	SM232022822	HSMS2822
CR4004	SM236030099	BAV99
CR4005	SM232022822	HSMS2822
CR4006	SM236030099	BAV99
CR4007	SM236030099	BAV99
CR5000	SM229020150	SMTVSS-5V6
CR5001	SM236030099	BAV99
CR5002	SM252023018	BAT18
CR5003	SM236030099	BAV99
CR5004	SM236030099	BAV99
CR5005	SM236030099	BAV99
CR5006	SM240050033	TZMC3V3
CR5007	SM240050033	TZMC3V3
CR6000	SM229020150	SMTVSS-5V6

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

Location	Part Number	Description	Location	Part Number	Description
CR6001	SM253032823	HSMS2823	RN901	190042103	10K-SIPC
CR6002	SM232022822	HSMS2822	RN902	190042103	10K-SIPC
CR6003	SM240050051	TZMC5V1	RN903	190042103	10K-SIPC
CR6004	SM236030099	BAV99	RN904	190042103	10K-SIPC
DL200	29012000	66nS	RN905	190042103	10K-SIPC
DL400	29012001	10nS	TP100	454313010	2x5-ST-M-NW
DL401	29012000	66nS	TP200	454313010	2x5-ST-M-NW
RL1000	430441732	RL-732-12	TP201	454313010	2x5-ST-M-NW
RL1001	430430002	RL-FBR22-12	TP202	454313010	2x5-ST-M-NW
RL1002	430441732	RL-732-12	TP205	454313010	2x5-ST-M-NW
RL1003	430430002	RL-FBR22-12	TP206	454340002	2x1-ST-M-NW
RL1500	430490003	RL-TQ2-12	TP400	454340002	2x1-ST-M-NW
RL2000	430441732	RL-732-12	TP1000	454340002	2x1-ST-M-NW
RL2001	430430002	RL-FBR22-12	TP1500	454315008	2x4-ST-M-NW
RL2002	430441732	RL-732-12	TP1501	454313010	2x5-ST-M-NW
RL2003	430430002	RL-FBR22-12	TP1502	454313010	2x5-ST-M-NW
RL2500	430490003	RL-TQ2-12	TP2000	454340002	2x1-ST-M-NW
RL4000	430490750	RL-UR1-12	TP2500	454315008	2x4-ST-M-NW
RL5000	430490003	RL-TQ2-12	TP2501	454313010	2x5-ST-M-NW
RL5001	430490003	RL-TQ2-12	TP2502	454313010	2x5-ST-M-NW
RL5002	430490003	RL-TQ2-12	TP4000	454313010	2x5-ST-M-NW
RN900	190042103	10K-SIPC	TP5000	454340002	2x1-ST-M-NW

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
146544471	CAP MINI ALUM 20% 470UF	1
158849009	CAP VARIABLE .5 - 2.5 PF	2
158849012	CAP VARIABLE 5.0-15 PF	2
161665100	RES COMP 2W 5% 10 OHMS	2
169416473	RESISTOR DISC NTC 47 K	1
190042103	RESISTOR NETWORK 10 K	6
205750000	IC AND-OR GATE ARRAY 16V8	3
207200508	IC 8-BIT FLASH ADC 97508	2
208122002	IC VOLT REG POS UA7805	3
208123002	IC +12 VOLT REG LM340T-12	3
208124002	IC VOLT REG -5V UA7905UC	2
208124003	IC VOLT REG NEG LM320T-12	3
208590336	IC VOLT REFERENCE LM336	1
271211676	PNP POWER DARLINGTON BD676	2
290120006	DELAY LINE 6 N-SEC	3
290120010	DELAY LINE 10 N-SEC	1
310062100	CRYSTAL 10PPM 100MHZ	1

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
310100833	SAW RESONATOR 833MHZ	1
400410046	IC SOCKET GRID TYP 46	2
400410068	IC SOCKET GRID TYP 68-POS	2
430430002	RELAY 1 FORM C SPDT	4
430441732	RELAY 2 FORM CDPDT	4
430490003	RELAY 2 FORM C DPDT	5
430490750	RELAY HF DPDT 75 OHMS	2
454110010	HDR SOLD TAIL/MALE PIN 10	1
454313010	HDR DIP SOLD TO PCB 2X5	10
454315008	HDR DIP SOLD TO PCB 2X4	2
454320096	HDR DIP SOLD TO FEM 96	1
454340002	HDR MALE PIN TO WW 02	5
454390002	HDR FRICTION LOCK 2-PIN	1
530040007	BUZZER 85DB 5V SMALL	1
550430105	SCREW CYL HD PHIL M3X5	2
554425003	SCREW S/TAP PHIL M2.5X6 BL	6
554435401	"RIVET ""RIVSCREW"" M 3.5"	11
585252236	RIVET HOLLOW 2.5X6MM	2
709360331	BASE SHIELD	1
709360361	HEATSINK	2
709360371	HEAT SINK	1
7093XX361	SHIELD LOWER PARTITION	4
7093XXP01	RIGHT ANGLE RECEPT. CONNEC	6
7093XXP21	BULKHEAD RECEPTACLE FEMALE	6
7093XXP41	PROBE HOLDER	6
7093XXP91	PROBE RING CONTACT	6
709450321	HEAT SINK FOR FADC	1
719360303	PC BD PREASS'Y 9360-3	1
CH599043022	HEAT SINK EPOXY	0
FP9360-3	MAIN CARD PANEL 9360-3	1
HSH410	HYB SAMPLE & HOLD HSH410	2
HWD418	MWD 624 HYBRID	2
MCL404	IC MEM GATE ARRAY MCL404	1
MDX407	IC DEMULTIPLEXER MDX407	2
MFE409	MONOL. DSO FRONT END (500M	2
MMC413	IC MWD CONTROLLER GATE ARR	1
MST412	IC SMART TRIGGER GATE-ARRA	1
MTB411	IC TIME BASE GATE-ARRAY	1
MTR408	TRIGGER COUPLING & COMPARA	2
SM158240200	CAP VARIABLE .6 - 2.5 PF	5
SM158240202	CAP VARIABLE 2.5 - 10 PF	2
SM168651002	RES METAL FILM 1% 120 OHMS	8
SM168651297	RES METAL FILM 1% 100 OHMS	4
SM168659004	RES METAL FILM .1% 900 OHM	2

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM168659006	RES METAL FILM .1% 111.1 K	1
SM168659007	RES METAL FILM .1% 3.00K	5
SM168659297	RES METAL FILM .1% 100 OHM	4
SM185457102	RES VARI CERMET 1 K	3
SM185457103	RES VARI CERMET 10 K	11
SM185457201	RES VARI CERMET 200 OHMS	3
SM185457202	RES VARI CERMET 2 K	2
SM185457203	RES VARI CERMET 20 K	6
SM200167102	IC NOR GATE 10H102	1
SM200167103	IC 2-INP OR GATE 10H103	1
SM200167105	IC 2-3-2 OR/NOR 10H105	1
SM200167121	IC OR-AND/O-A-INV 10H121	1
SM200167131	IC M-S TYP D FLOP 10H131	3
SM200172000	IC 2-INPUT NAND 74F00	1
SM200172008	IC AND GATE 74F08	1
SM200178000	IC 2-INPUT NAND HCT00	1
SM200178002	IC 2-INPUT NOR HCT02	4
SM200178008	IC 2-INPUT AND HCT08	1
SM200178030	IC 8-IN NAND HCT30	1
SM200178074	IC D-TYP FLOP 74HCT74	1
SM200178138	IC 3-8 LINE DECOD HCT 138	3
SM200178139	IC 2-TO-4-LINE DEC HCT139	1
SM200178273	IC D-TYP FLOP 74HCT273	1
SM200178374	IC D-TYP FLOP 74HCT374	1
SM200278040	IC COUNTER HCT4040	1
SM201174011	IC ECL 1:2 DIF CLOCK DRVR	6
SM205108002	IC EEPROM 2K BIT IIC BUS	1
SM205228863	IC 8K X 8 STATIC RAM 25NS	8
SM205618165	IC 8-BIT SHIFT REG 74HCT16	1
SM205618594	IC 8-BIT SHIFT REG 74HC594	9
SM206070584	IC BUS CONTROLLER PCF8584T	1
SM206260858	IC OCT 8-BIT ADC0858	1
SM206886623	IC OCTAL BUS TRANSCVR. BCT	2
SM207130025	TRANSISTOR NPN BFT25A	1
SM207178541	IC BUFFER/LINE DR HCT541	7
SM207280703	IC 16-BIT DAC 703	1
SM207288800	IC OCTAL 8-BIT CMOS D/A CO	1
SM207360125	IC TRANSLATO MC10125	5
SM207460116	IC LINE RECEIVER 10H116	7
SM207770201	IC ANALOG SWITCH DG201	4
SM207770403	IC ANALOG SWITCH DG403	4
SM207770442	IC ANALOG SWITCH DG442	3
SM207878245	IC BUS TRANSCVR HCT 245	2
SM207970351	IC OCTAL ANALOG MUX/DEMUX	1

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM207978153	IC 4-INPUT MUX HCT153	1
SM207978251	IC 8-IN MUX 3-ST 74HCT251	2
SM208030245	IC TRANS ARRAY NPNX6 SL324	1
SM208470037	IC OP AMP 37GS	1
SM208470324	IC OP AMP LM324M	8
SM208470347	IC J-FET OP AMP 347	2
SM208470353	IC DUAL OP AMP 353	4
SM208470358	IC DUAL OP AMP 358D	3
SM208470705	IC OP AMP PICOAMP INPUT AD	4
SM208470844	IC OP AMP AD844 JR	2
SM208473100	IC OP AMP CA3100	5
SM208476365	IC HIGH SPEED OP AMP LM636	2
SM208479630	IC BUFFER AMP AD9630	2
SM208572951	IC VOLT REG LP2951	1
SM208870339	IC VOLT COMPARATOR 339	3
SM208971881	IC VIDEO SYNC SEPARATOR LM	1
SM229020150	MLC TR.VOLT SUP.VC08050561	6
SM232022822	DIODE ARRAY SCHTTKY 2822	11
SM236030099	DIODE SO-PKG BAV99	29
SM236654004	DIODE RECTIFIER 4004	2
SM240050033	DIODE ZENER TZM-C-3V3	2
SM240050051	DIODE ZENER TZM-C-5V1	3
SM240218451	DIODE ZENER BZX84C5V1	1
SM240218462	DIODE ZENER BZX84C6V2	2
SM240218475	DIODE ZENER BZX84C7V5	2
SM252023018	DIODE PIN BAT 18	3
SM252080682	DIODE PIN BA682	5
SM253032823	DIODE SCHOTTKY 2823	1
SM270030020	TRANSISTOR NPN BFS20	5
SM270080054	TRANSISTOR NPN BCX54	8
SM270130092	TRANSISTOR NPN BFR92A	22
SM270130093	TRANSISTOR NPN BFR93A	1
SM270140092	TRANSISTOR NPN BFR92AR	1
SM270160133	TRANSISTOR NPN HF BFG33X	11
SM270330848	TRANSISTOR NPN BC848C	14
SM275030092	TRANSISTOR PNP BFT92	6
SM275030093	TRANSISTOR PNP BFT93	2
SM275030550	TRANSISTOR PNP BF550	10
SM275040093	TRANSISTOR PNP BFT93R	2
SM275330858	TRANSISTOR PNP BC858C	14
SM280120309	TRANSISTOR N-JFET SST309	2
SM280120416	TRANSISTOR JFET N MMBF4416	3
SM280171005	TRANS POWER MOSFET MTD10N0	3
SM289240062	TRANSISTOR ARRAY BCV62	2

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

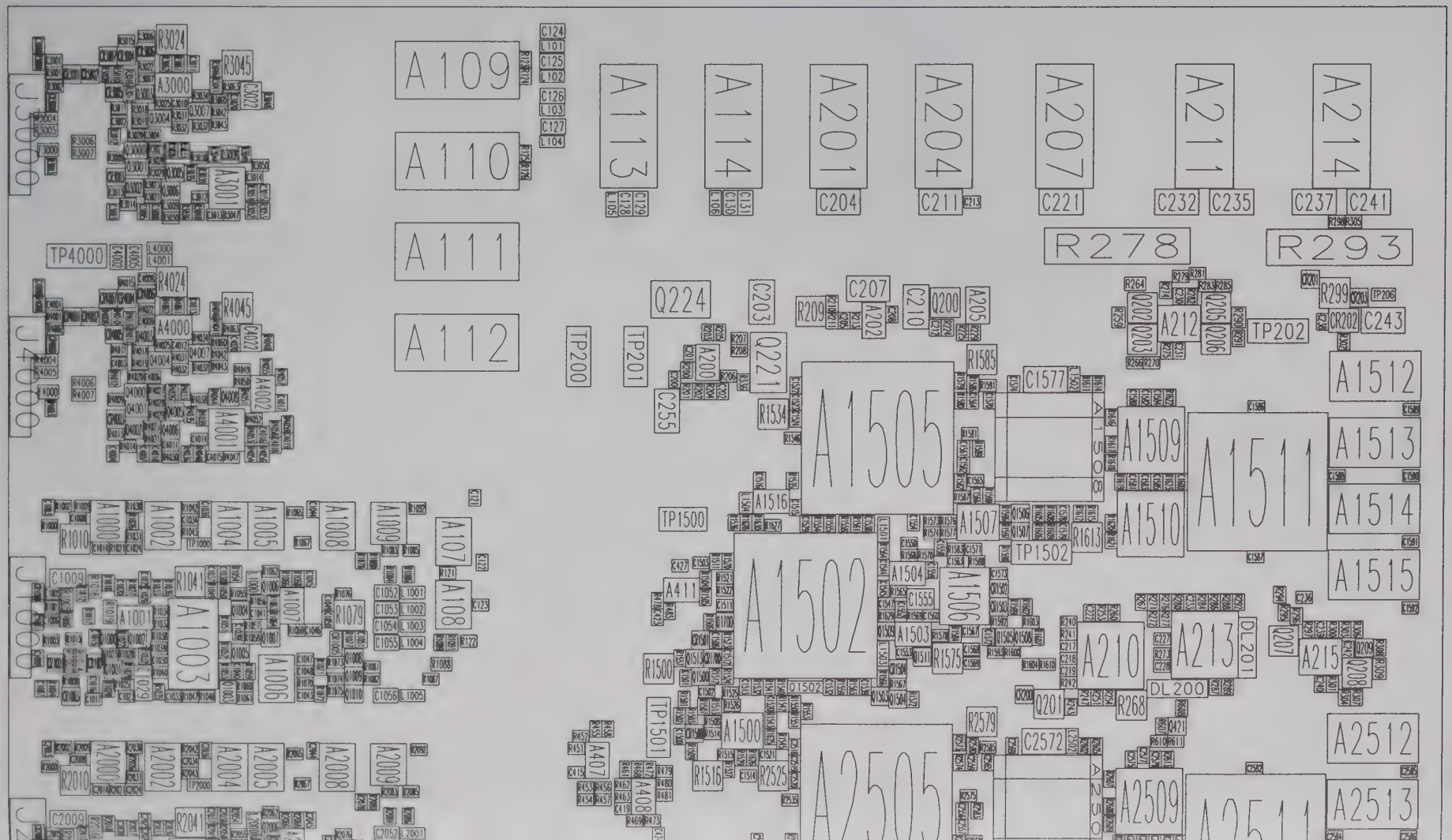
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM289772003	TRANSISTOR ARRAY 2003	2
SM300446150	INDUCTOR .015UH	1
SM300486104	INDUCTOR WOUND 100uH	2
SM300546151	INDUCTOR .15 UH	1
SM301502001	BEAD (FERRITE CHIP)	34
SM433012001	FUSE THIN FILM 200 MA	2
SM651104153	RES CHIP 1% 25PPM 15 K OHM	1
SM651104182	RES CHIP 1% 25PPM 1.8K	2
SM651104202	RES CHIP 1% 25PPM 2K	1
SM651104203	RES CHIP 1% 25PPM 20K	1
SM651104204	RES CHIP 1% 25PPM 200 K	1
SM651104241	RES CHIP 1% 25PPM 240 OHM	1
SM651104391	RES CHIP 1% 25PPM 390 OHMS	1
SM651104392	RES CHIP 1% 25PPM 3.9K	1
SM651104472	RES CHIP 1% 25PPM 4.7 K OH	1
SM652101100	RES CHIP (E24) 1% 10 OHMS	26
SM652101101	RES CHIP (E24) 1% 100 OHM	55
SM652101102	RES CHIP (E24) 1% 1 K	54
SM652101103	RES CHIP (E24) 1% 10 K	64
SM652101104	RES CHIP (E24) 1% 100 K	16
SM652101105	RES CHIP (E24) 1% 1 M	14
SM652101111	RES CHIP (E24) 1% 110 OHM	3
SM652101112	RES CHIP (E24) 1% 1.1 K	4
SM652101113	RES CHIP (E24) 1% 11 K	2
SM652101114	RES CHIP (E24) 1% 110 K	3
SM652101121	RES CHIP (E24) 1% 120 OHM	6
SM652101122	RES CHIP (E24) 1% 1.2 K	15
SM652101131	RES CHIP (E24) 1% 130 OHM	1
SM652101132	RES CHIP (E24) 1% 1.3 K	4
SM652101151	RES CHIP (E24) 1% 150 OHM	31
SM652101152	RES CHIP (E24) 1% 1.5 K	10
SM652101153	RES CHIP (E24) 1% 15 K	8
SM652101163	RES CHIP (E24) 1% 16 K	4
SM652101181	RES CHIP (E24) 1% 180 OHM	20
SM652101182	RES CHIP (E24) 1% 1.8 K	5
SM652101183	RES CHIP (E24) 1% 18 K	5
SM652101185	RES CHIP (E24) 1% 1.8 M	4
SM652101201	RES CHIP (E24) 1% 200 OHM	7
SM652101202	RES CHIP (E24) 1% 2 K	28
SM652101203	RES CHIP (E24) 1% 20 K	11
SM652101220	RES CHIP (E24) 1% 22 OHMS	16
SM652101221	RES CHIP (E24) 1% 220 OHM	20
SM652101222	RES CHIP (E24) 1% 2.2 K	13
SM652101223	RES CHIP (E24) 1% 22 K	11

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM652101224	RES CHIP (E24) 1% 220 K	2
SM652101240	RES CHIP (E24) 1% 24 OHMS	11
SM652101241	RES CHIP (E24) 1% 240 OHM	9
SM652101271	RES CHIP (E24) 1% 270 OHM	16
SM652101272	RES CHIP (E24) 1% 2.7 K	6
SM652101273	RES CHIP (E24) 1% 27 K	4
SM652101301	RES CHIP (E24) 1% 300 OHM	9
SM652101302	RES CHIP (E24) 1% 3 K	4
SM652101330	RES CHIP (E24) 1% 33 OHMS	26
SM652101331	RES CHIP (E24) 1% 330 OHM	8
SM652101332	RES CHIP (E24) 1% 3.3 K	27
SM652101333	RES CHIP (E24) 1% 33 K	2
SM652101334	RES CHIP (E24) 1% 330 K	3
SM652101360	RES CHIP (E24) 1 % 36 OHM	6
SM652101363	RES CHIP (E24) 1% 36 K	2
SM652101390	RES CHIP (E24) 1% 39 OHMS	9
SM652101391	RES CHIP (E24) 1% 390 OHM	13
SM652101392	RES CHIP (E24) 1% 3.9 K	4
SM652101393	RES CHIP (E24) 1% 39 K	2
SM652101431	RES CHIP (E24) 1% 430 OHM	2
SM652101470	RES CHIP (E24) 47 OHMS	2
SM652101471	RES CHIP (E24) 1% 470 OHM	56
SM652101474	RES CHIP (E24) 1% 470 K	1
SM652101475	RES CHIP (E24) 1% 4.7 M	4
SM652101510	RES CHIP (E24) 1% 51 OHMS	31
SM652101511	RES CHIP (E24) 1% 510 OHM	3
SM652101512	RES CHIP (E24) 1% 5.1 K	38
SM652101513	RES CHIP (E24) 1% 51 K	1
SM652101560	RES CHIP (E24) 1% 56 OHM	16
SM652101561	RES CHIP (E24) 1% 560 OHM	3
SM652101562	RES CHIP (E24) 1% 5.6 K	13
SM652101680	RES CHIP (E24) 1% 68 OHMS	60
SM652101681	RES CHIP (E24) 1% 680 OHM	2
SM652101683	RES CHIP (E24) 1% 68 K	3
SM652101684	RES CHIP (E24) 1% 680 K	1
SM652101750	RES CHIP (E24) 1% 75 OHMS	13
SM652101751	RES CHIP (E24) 1% 750 OHM	7
SM652101752	RES CHIP (E24) 1% 7.5 K	2
SM652101820	RES CHIP (E24) 1% 82 OHMS	3
SM652101821	RES CHIP (E24) 1% 820 OHM	5
SM652101822	RES CHIP (E24) 1% 8.2 K	5
SM652101824	RES CHIP (E24) 1% 820 K	2
SM652101912	RES CHIP (E24) 1% 9.1 K	3
SM652101913	RES CHIP (E24) 1% 91 K	2

PART: F9360/61-3 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9360/61

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM652110904	RES CHIP 900K 0.5%	5
SM652113523	RES CHIP (24) 0.3% 52.63 K	2
SM652113954	RES CHIP (E24) 0.3% 950 K	2
SM653181101	RES THICK FILM 1% 1 OHM	4
SM653185390	RES THICK FILM 39 OHMS	2
SM654101000	CHIP JUMPER ZERO OHMS	10
SM661205822	CAP CERA CHIP 8200PF	2
SM661207103	CAP CERA CHIP 20% .01UF (0	79
SM661207104	CAP CERA CHIP 20% .1 UF	77
SM661207223	CAP CERA CHIP 20% .022 UF	2
SM661250047	CAP CERA CHIP 4.7 PF	5
SM661250082	CAP CERA CHIP .1% 8.2 PF	1
SM661255022	CAP CERA CHIP 2.2 PF	5
SM661255027	CAP CERA CHIP 2.7 PF	1
SM661255033	CAP CERA CHIP 3.3 PF	1
SM661255056	CAP CERA CHIP 5.6 PF	4
SM661255100	CAP CERA CHIP 10PF	2
SM661255101	CAP CERA CHIP 5% 100 PF	3
SM661255102	CAP CERA CHIP 5% 1000 PF	1
SM661255150	CAP CERA CHIP 5% 15 PF	4
SM661255181	CAP CERA CHIP 5% 180 PF	3
SM661255220	CAP CERA CHIP 5% 22 PF	4
SM661255270	CAP CERA CHIP 27PF	7
SM661255330	CAP CERA CHIP 5% 33 PF	4
SM661255470	CAP CERA CHIP 47PF	1
SM661255820	CAP CERA CHIP 5% 82 PF	2
SM661255821	CAP CERA CHIP 5% 820 PF	1
SM661256120	CAP CERA CHIP 10% 12 PF	2
SM661495561	CAP CERA CHIP 5% 560 PF	3
SM661726103	CAP CERA CHIP 10% .01UF (2	8
SM666237476	CAP MOLD TANT CHIP 47 UF	9
SM666247106	CAP MOLD TANT CHIP 10 UF	15
SM666327225	CAP MOLD TANT CHIP 2.2 UF	44
SM666427105	CAP MOLD TANT CHIP 1 UF	6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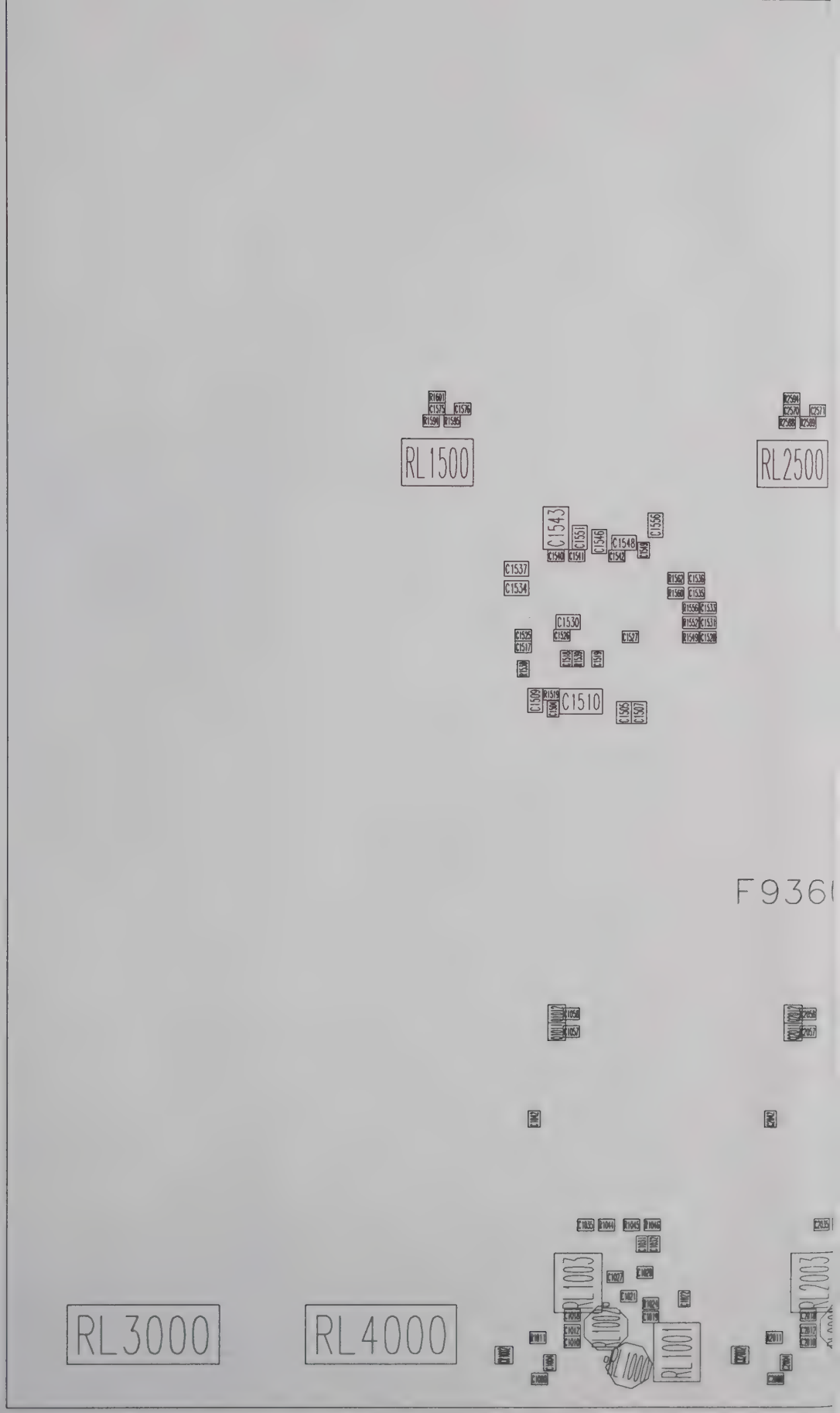
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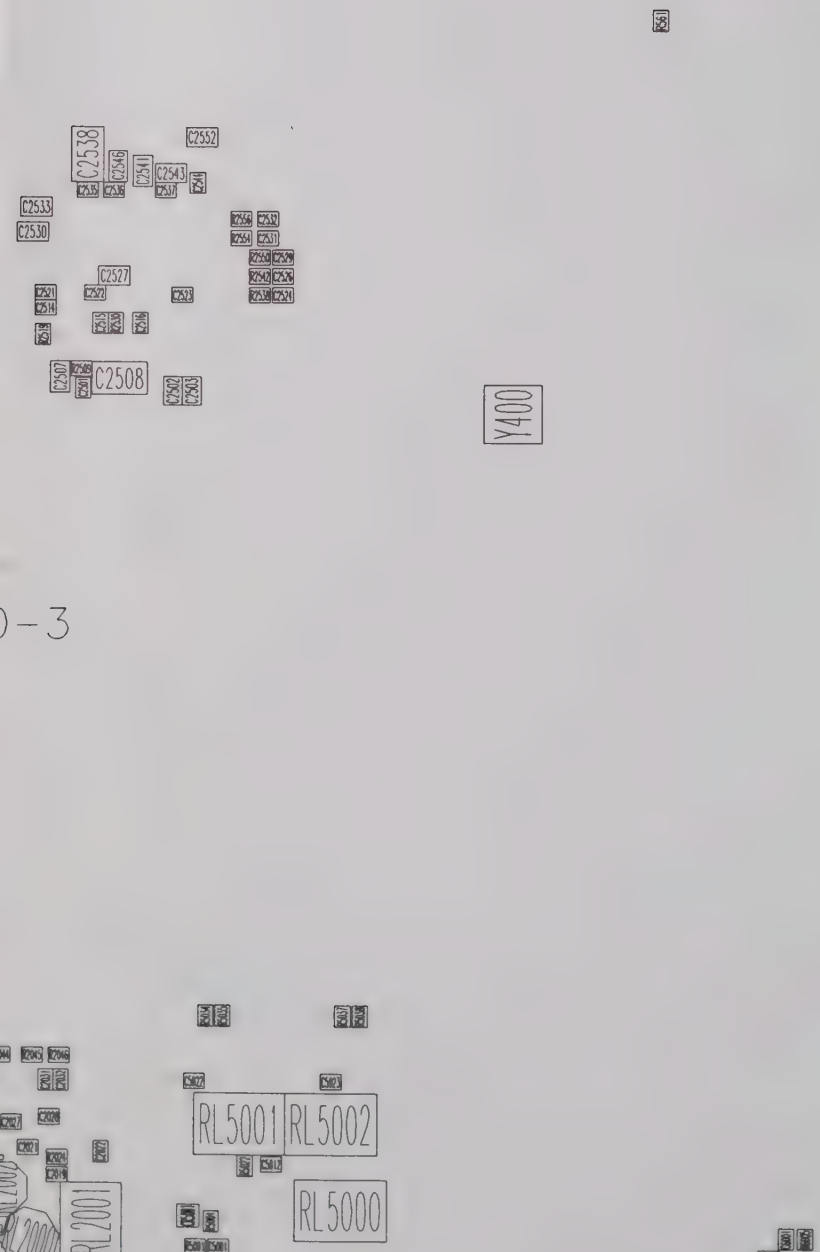
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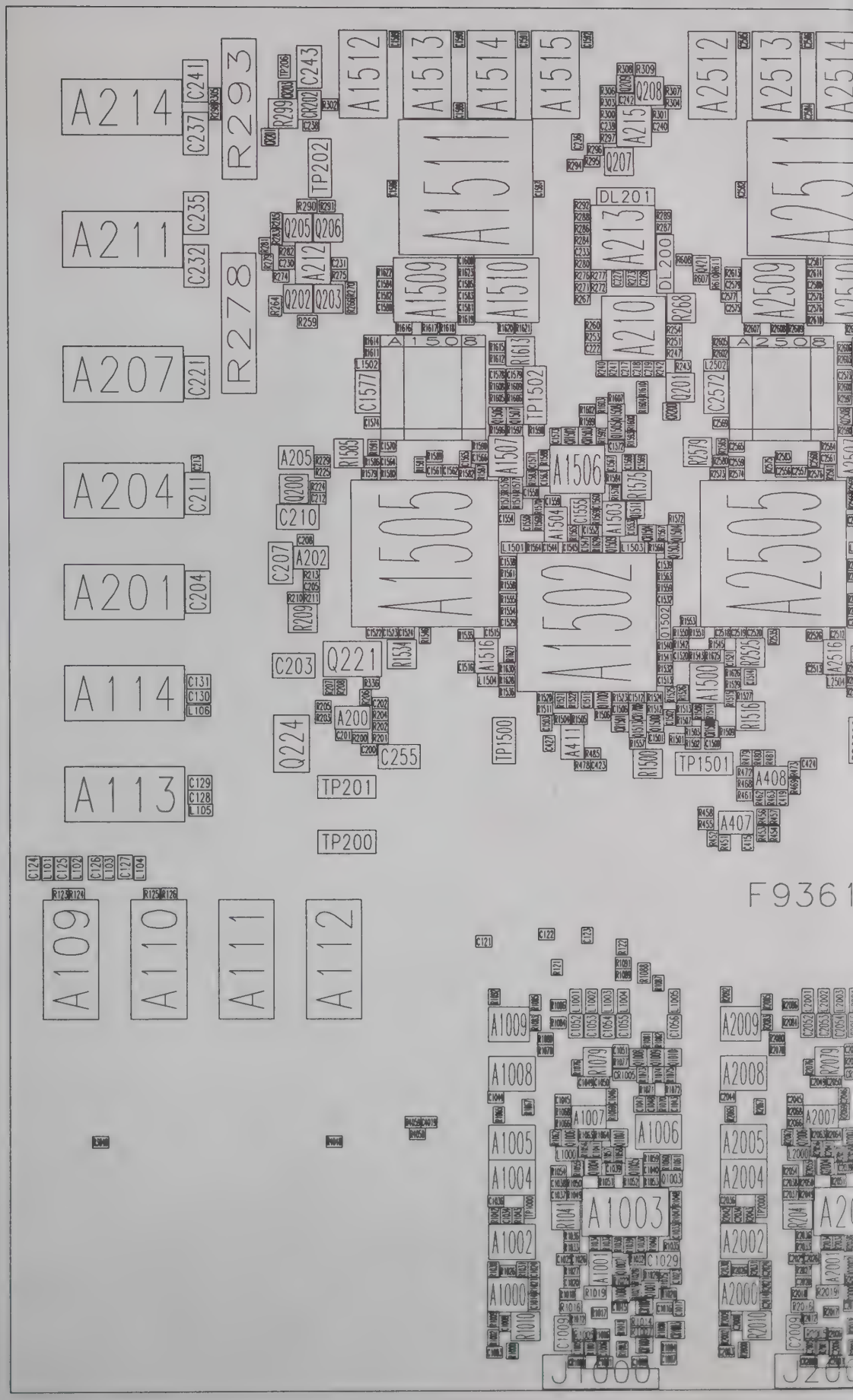
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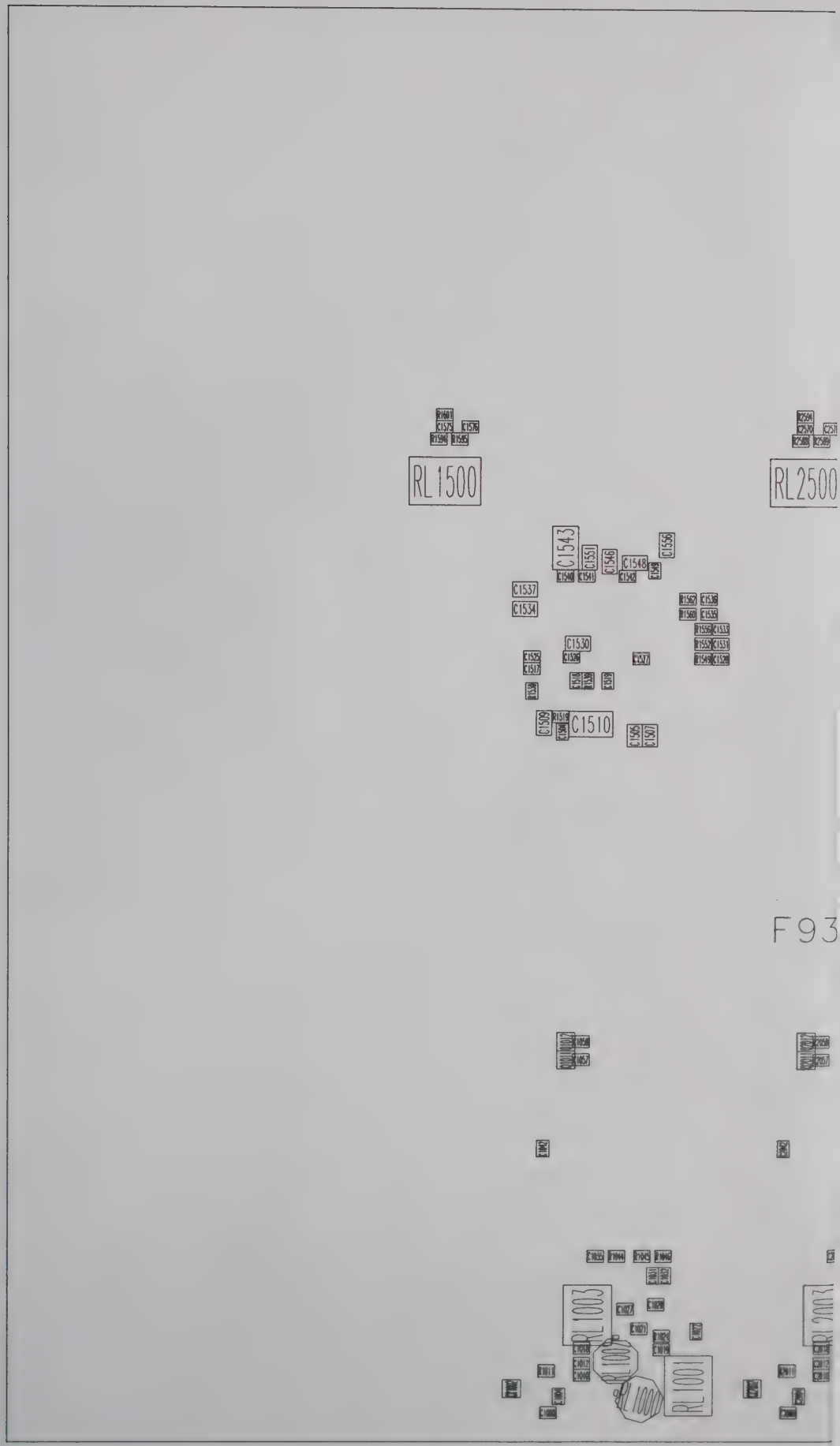
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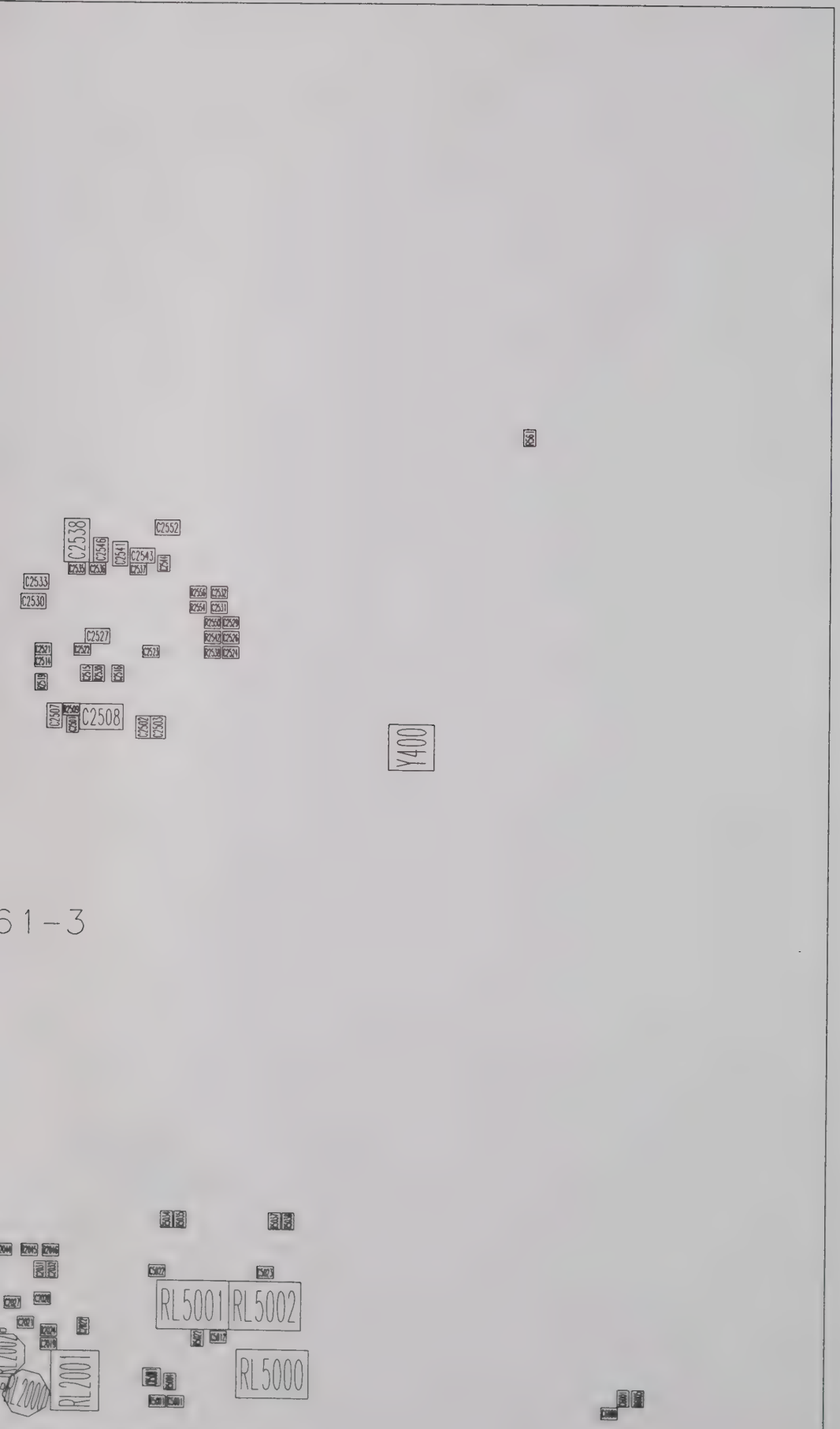
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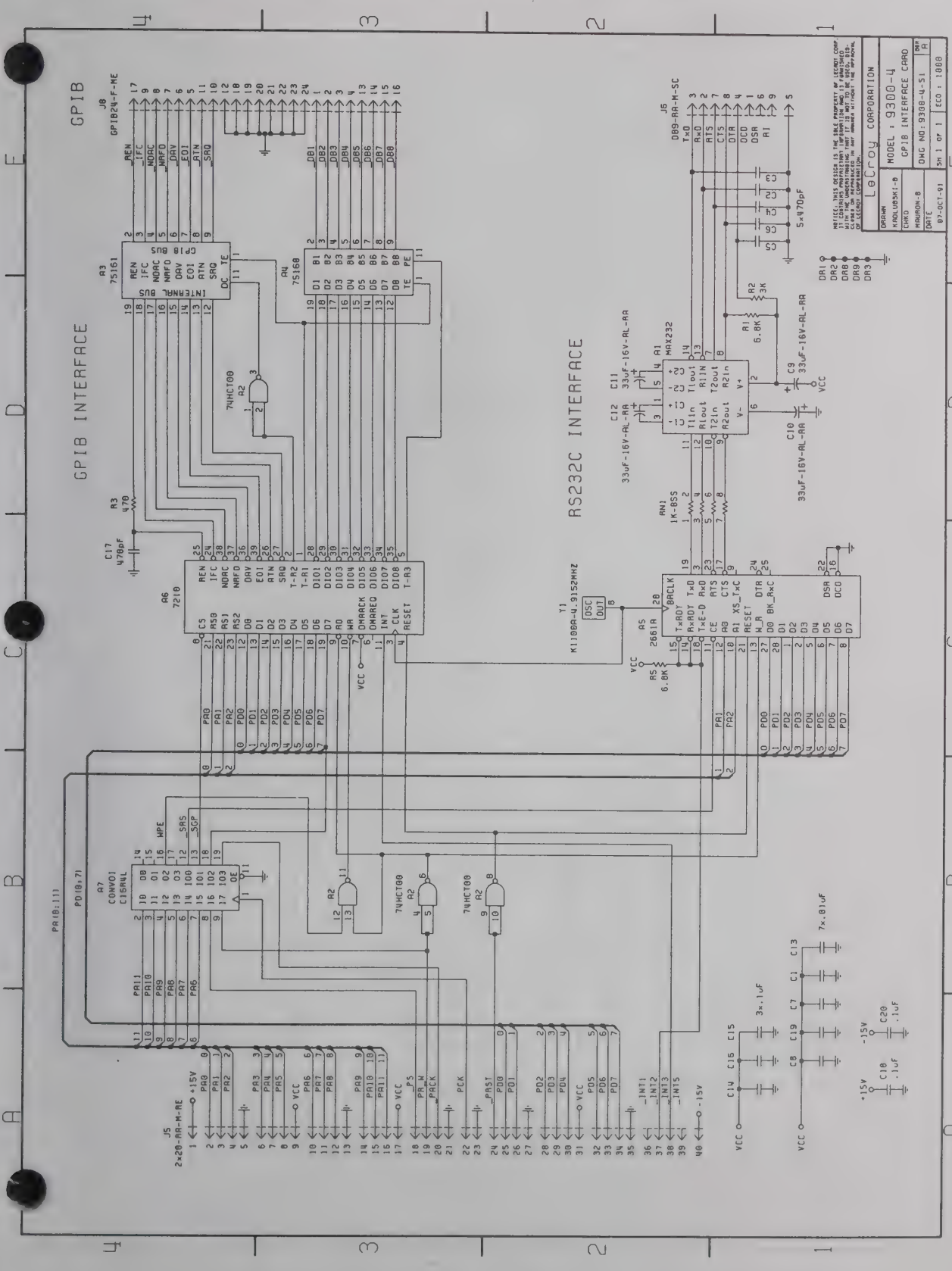
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7WHCT00
MAX232
J5
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LeCroy CORPORATION
MODEL : 9300-4
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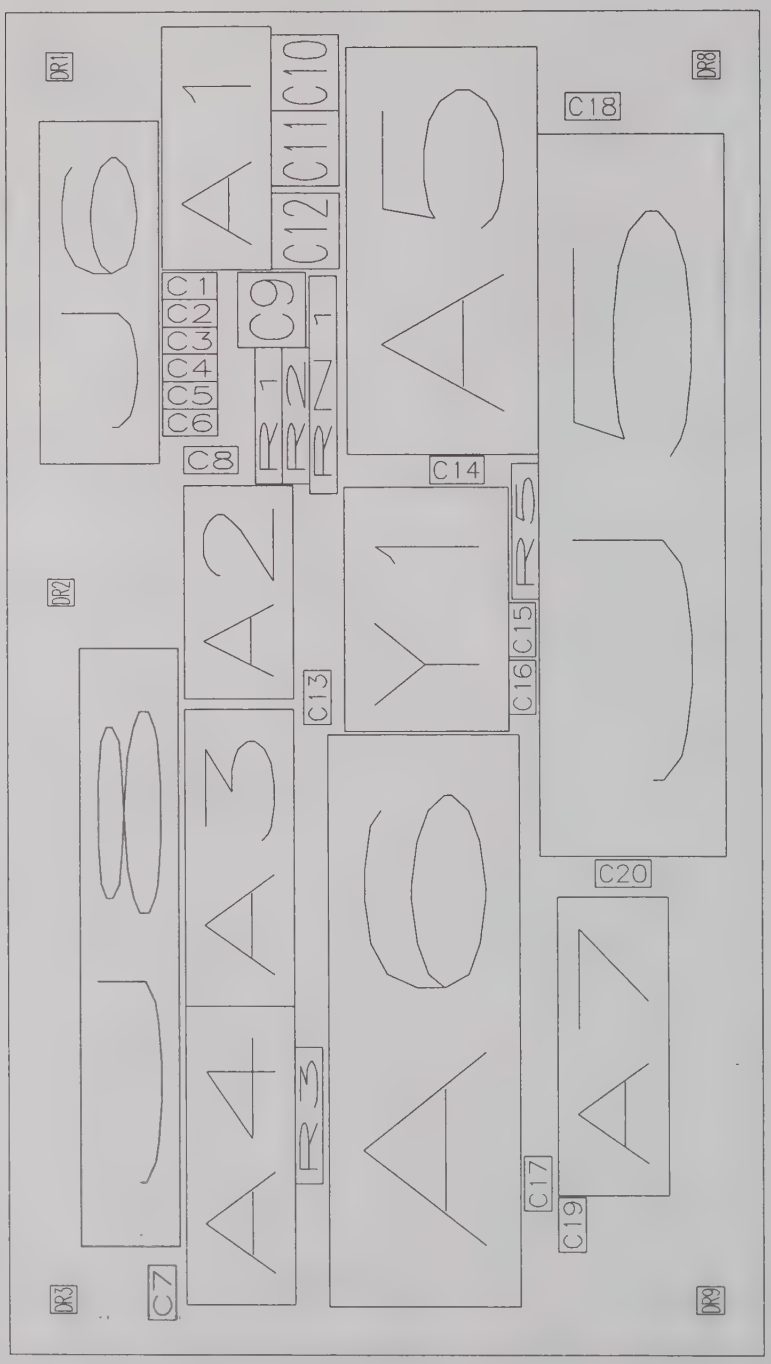
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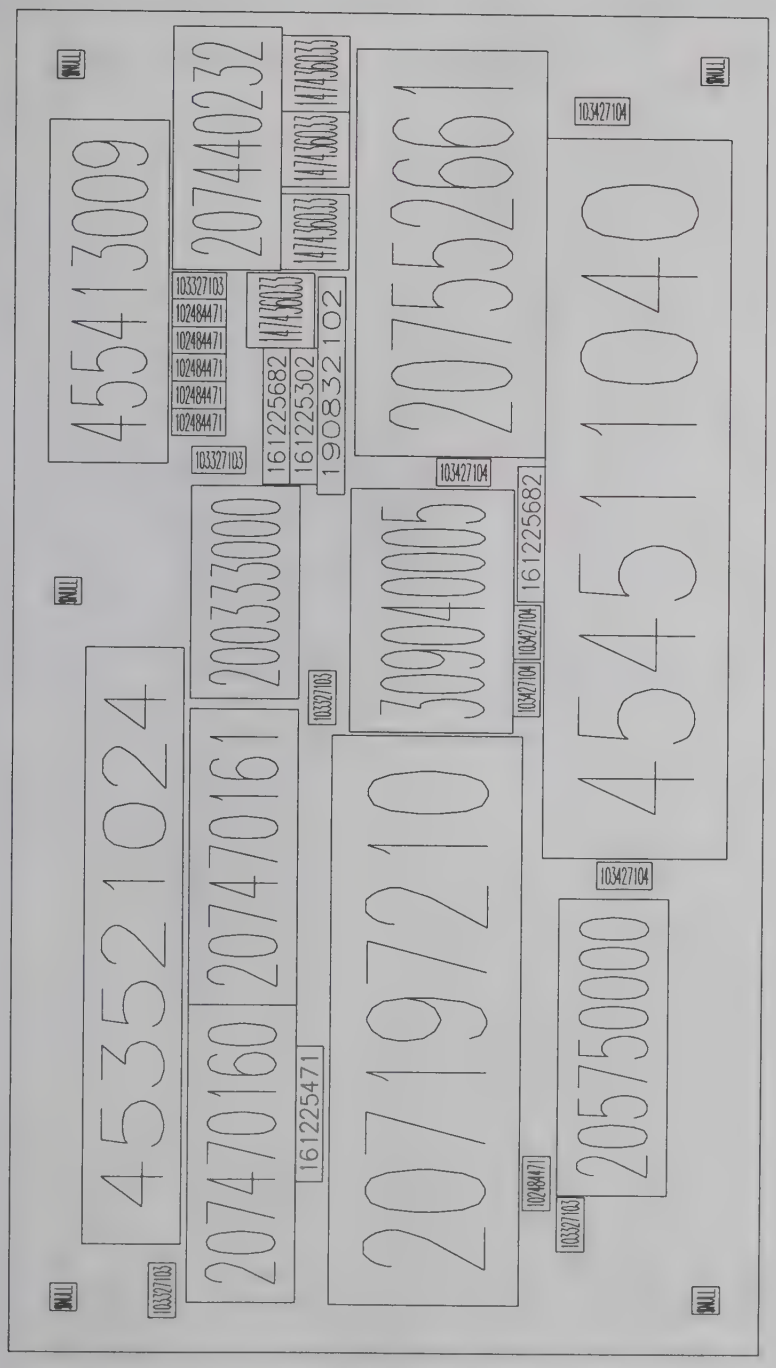
9300-4 REV:D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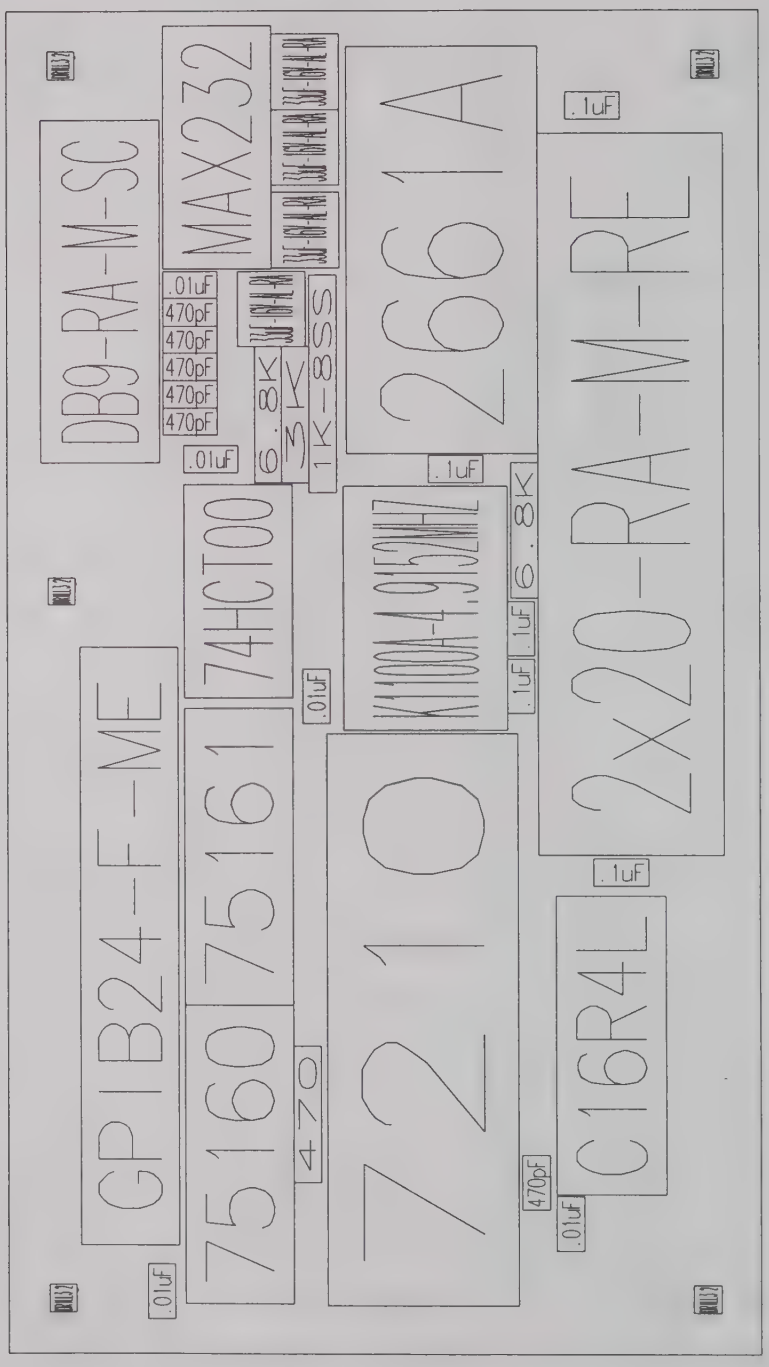
9300-4 REV:D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470

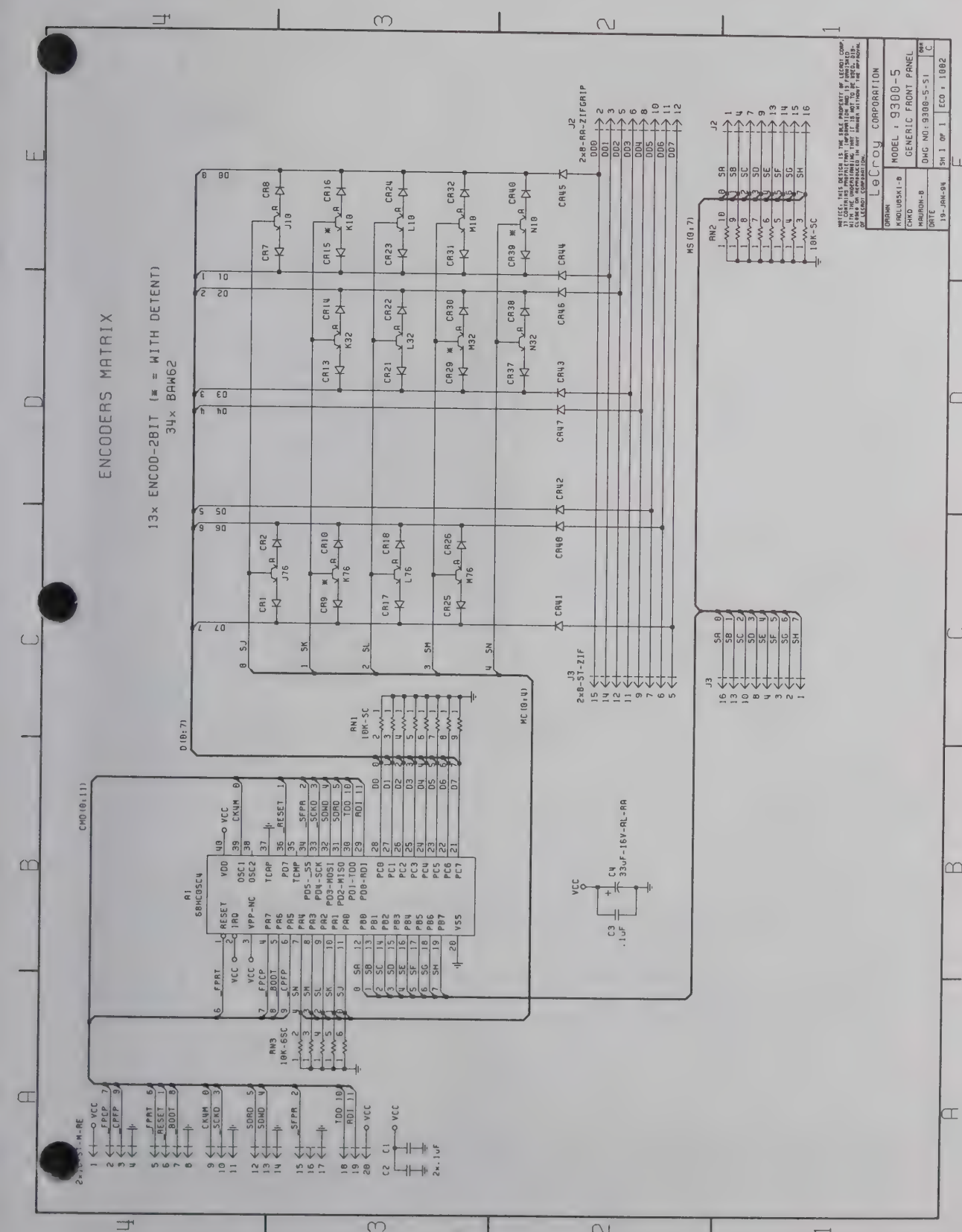
9300-4 REV:D

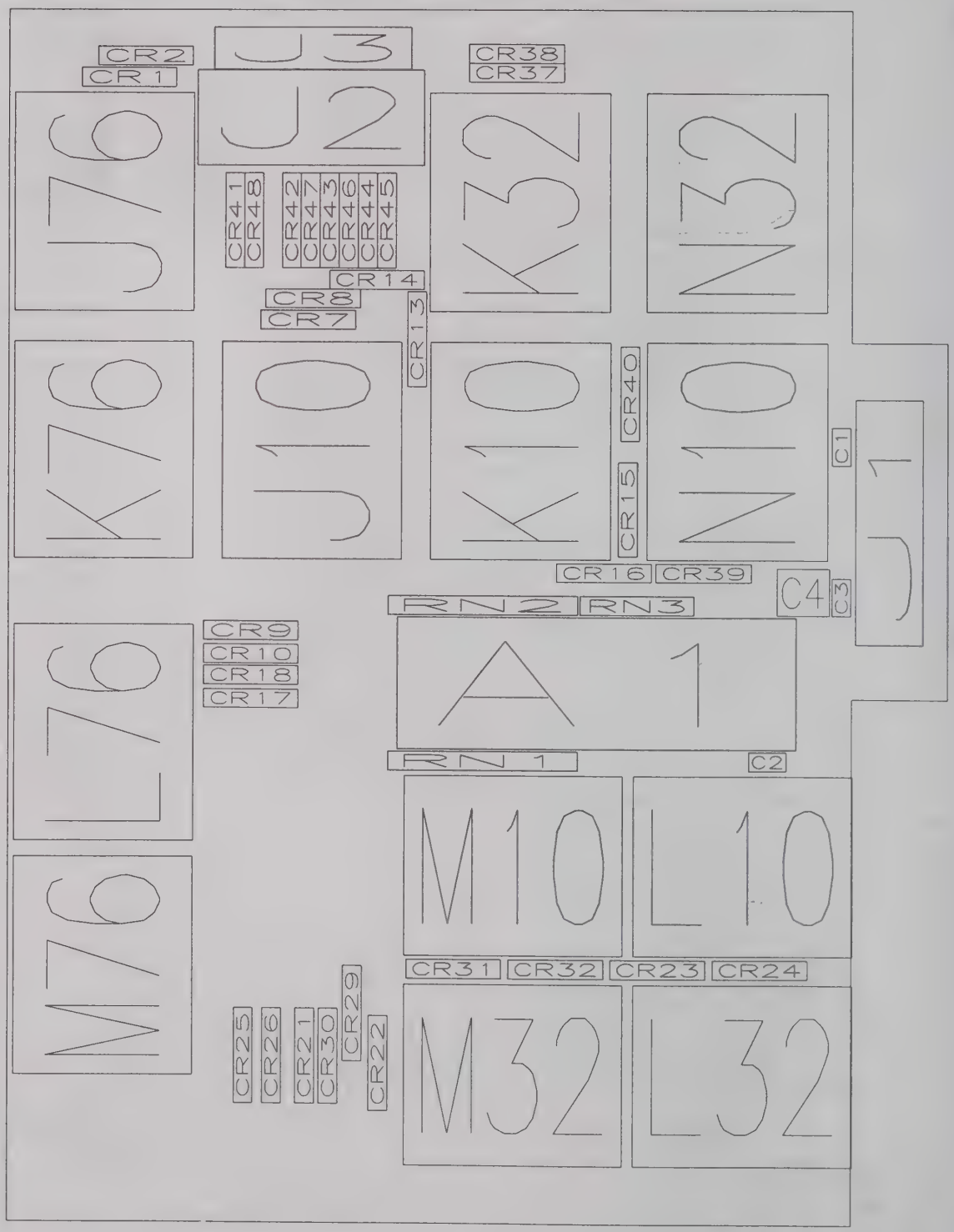
PART: F9300-4 **DESC: GPIB + RS232 INTERFACE CARD**

Location	Part Number	Description
A1	207440232	MAX232
A2	200333000	74HCT00
A3	207470161	75161
A4	207470160	75160
A5	207552661	2661A
A6	207197210	7210
A7	205750000	C16R4L
C1	103327103	.01uF
C2	102484471	470pF
C3	102484471	470pF
C4	102484471	470pF
C5	102484471	470pF
C6	102484471	470pF
C7	103327103	.01uF
C8	103327103	.01uF
C9	147436033	33uF-16V-AL-RA
C10	147436033	33uF-16V-AL-RA
C11	147436033	33uF-16V-AL-RA
C12	147436033	33uF-16V-AL-RA
C13	103327103	.01uF
C14	103427104	.1uF
C15	103427104	.1uF
C16	103427104	.1uF
C17	102484471	470pF
C18	103427104	.1uF
C19	103327103	.01uF
C20	103427104	.1uF
J5	454511040	2x20-RA-M-RE
J6	455413009	DB9-RA-M-SC
J8	453521024	GPIB24-F-ME
R1	161225682	6.8K
R2	161225302	3K
R3	161225471	470
R5	161225682	6.8K
RN1	190832102	1K-8SS
Y1	309040005	K1100A-4.9152MHZ

PART: F9300-4 **DESC: GPIB +RS232 INTERFACE CARD**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
102484471	CAP CERA DISC 100V 470 PF	6
103327103	CAP CERA MONO 50V .01 UF	5
103427104	CAP CERA MONO 100V .1 UF	5
147436033	CAP ALUM METAL CAN 33 UF	4
161225302	RES COMP 1/8W 5% 3 K	1
161225471	RES COMP 1/8W 5% 470 OHMS	1
161225682	RES CARBON FILM 6.8 K	2
190832102	RES NETWORK 1 K	1
200333000	IC QUAD 2-IN NAND HCT00	1
205750000	IC AND-OR GATE ARRAY 16V8	1
207197210	IC BUS INTERF CONTR 7210	1
207440232	IC XMTR/RCVR MAX 232	1
207470160	IC OCTAL BUS XCVR 75160A	1
207470161	IC OCTL BUS XCEIR 75161A	1
207552661	IC INTERFACE 2661A	1
309040005	CRYSTAL OSCIL. 4.9152MHZ	1
453521024	CONN RT ANGLE IEEE FEM 24	1
454511040	HDR SOLD TAIL/MALE/40/RT	1
455413009	CONN RT ANGLE MALE 9 S-CLIP	1
455980002	MOUNTING HDW FOR CONN SHELL	2
550130108	SCREW CYL HD M3X8	2
550430106	SCREW CYL HD PHIL M3X6	1
551430400	WASHER SHAKEPROOF M3	1
709300411	GPIB-RS232 INTERFACE BRACKET D	1
709300421	LABEL RS232-IEEE488-2 A	1
719300403	PC BD PREASS'Y 9300-4 D	1


ENCODERS MATRIX
13× ENCOD-2BIT (* = WITH DETENT)
34× BAW62
LeCroy CORPORATION
MODEL : 9300-5
GENERIC FRONT PANEL
DRAWN
KROLUBSKI-B
CHKD
MAURON-B
DATE
19-JAN-94
DWG NO: 9300-5-S1
SH 1 OF 1
ECO : 1082
A1
68HC05C4
J2
2×8-RA-ZIFGRIP
J3
2×8-ST-ZIF
RN1
10K-SC
RN2
10K-SC
RN3
10K-6SC
C1
2×.1uF
C3
.1uF
C4
33uF-16V-AL-RA
D(0:7)
MC(0:4)
MS(0:7)
CMD(0:11)


CR2
CR1
J3
J2
CR38
CR37
J76
CR41
CR48
CR42
CR47
CR43
CR46
CR44
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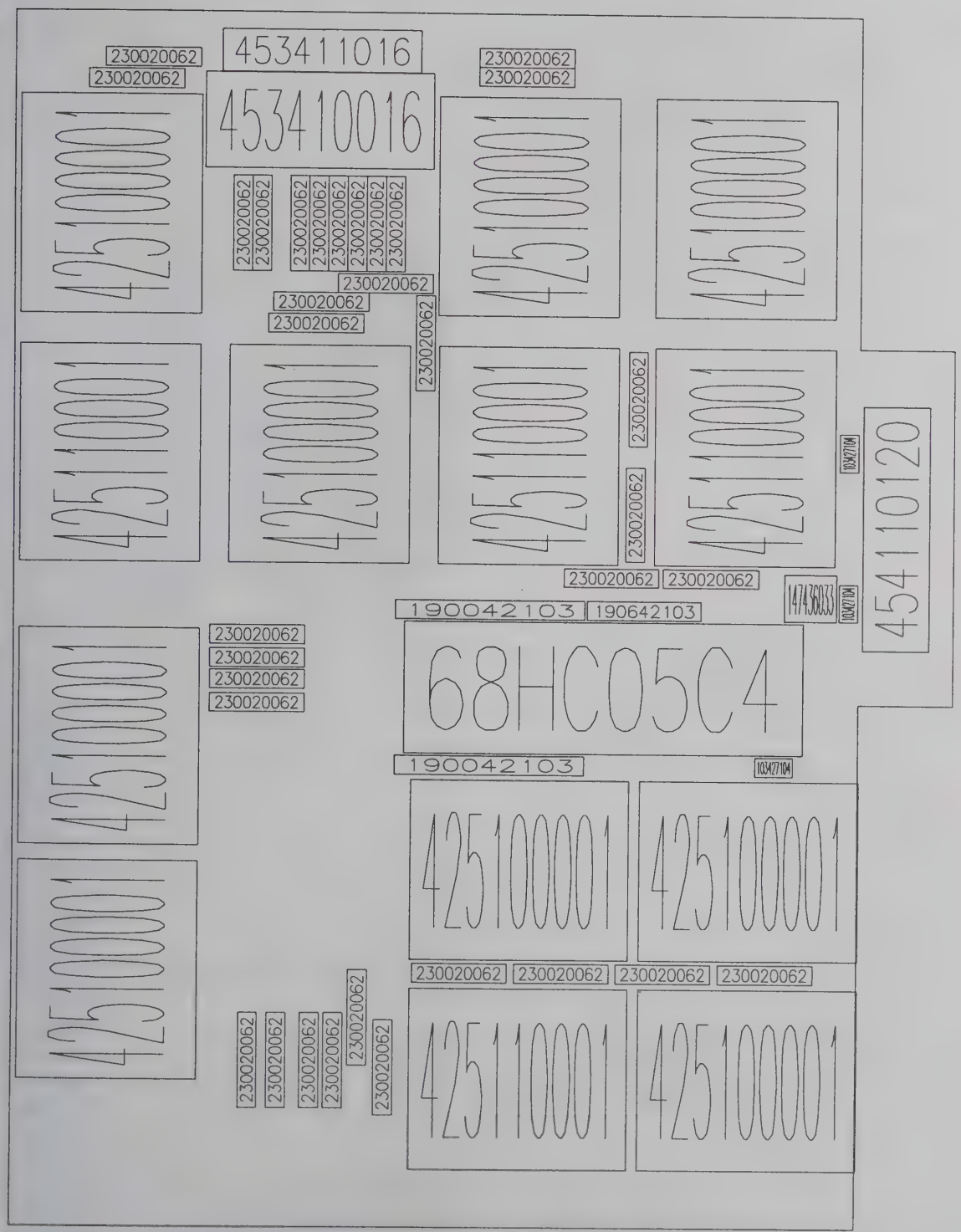
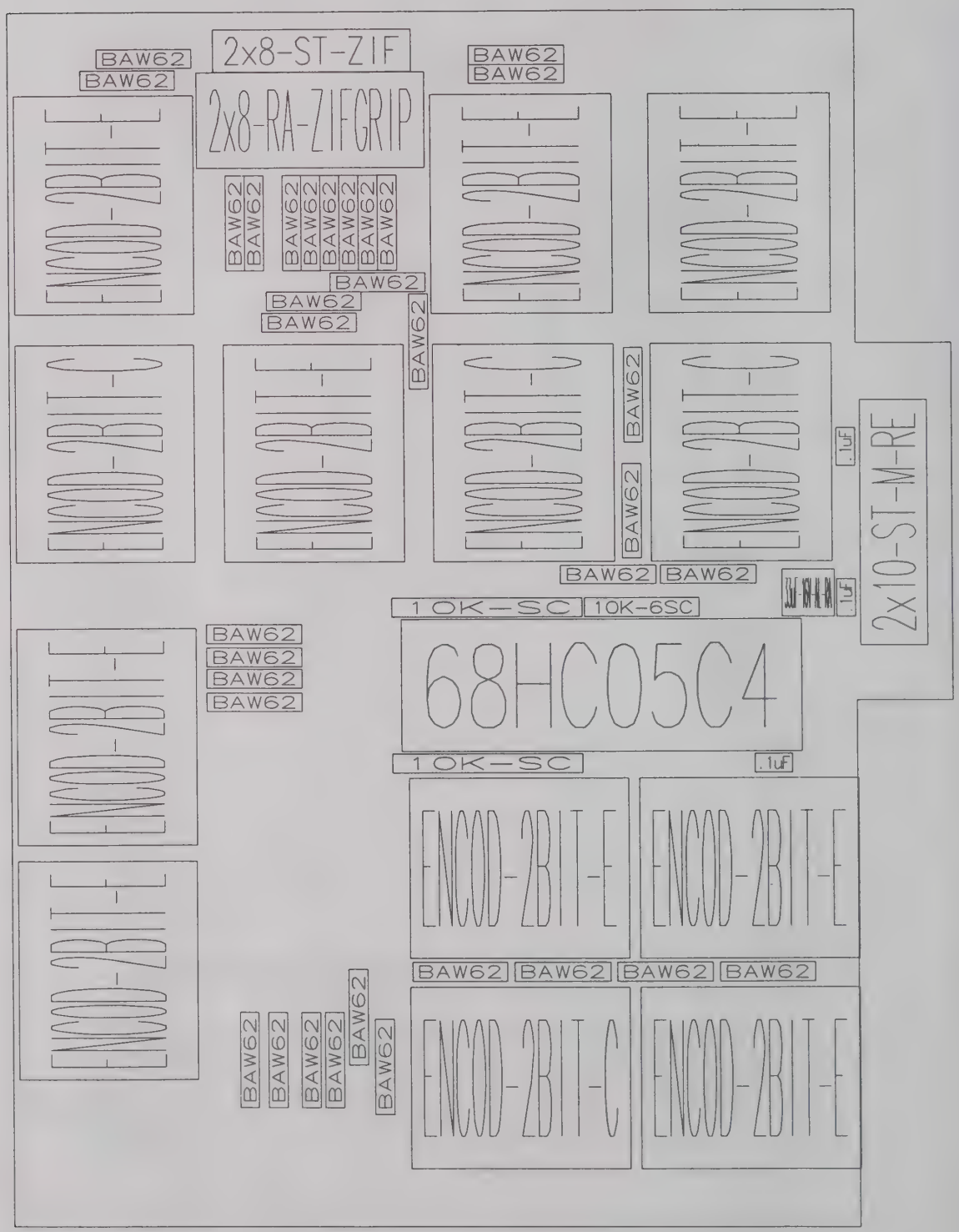
CR14
CR8
CR7
CR13
K32
N32
K76
J10
K10
CR40
N10
C1
CR15
J1
CR16
CR39
C4
C3
RN2
RN3
CR9
CR10
CR18
CR17
A1
L76
RN1
C2
M10
L10
M76
CR31
CR32
CR23
CR24
CR25
CR26
CR21
CR30
CR29
CR22
M32
L32
9300-5 Rev:B


453411016
453410016
230020062
425100001
425110001
454110120
190042103
190642103
68HC05C4
103427104
425110001
425100001

9300-5 Rev:B

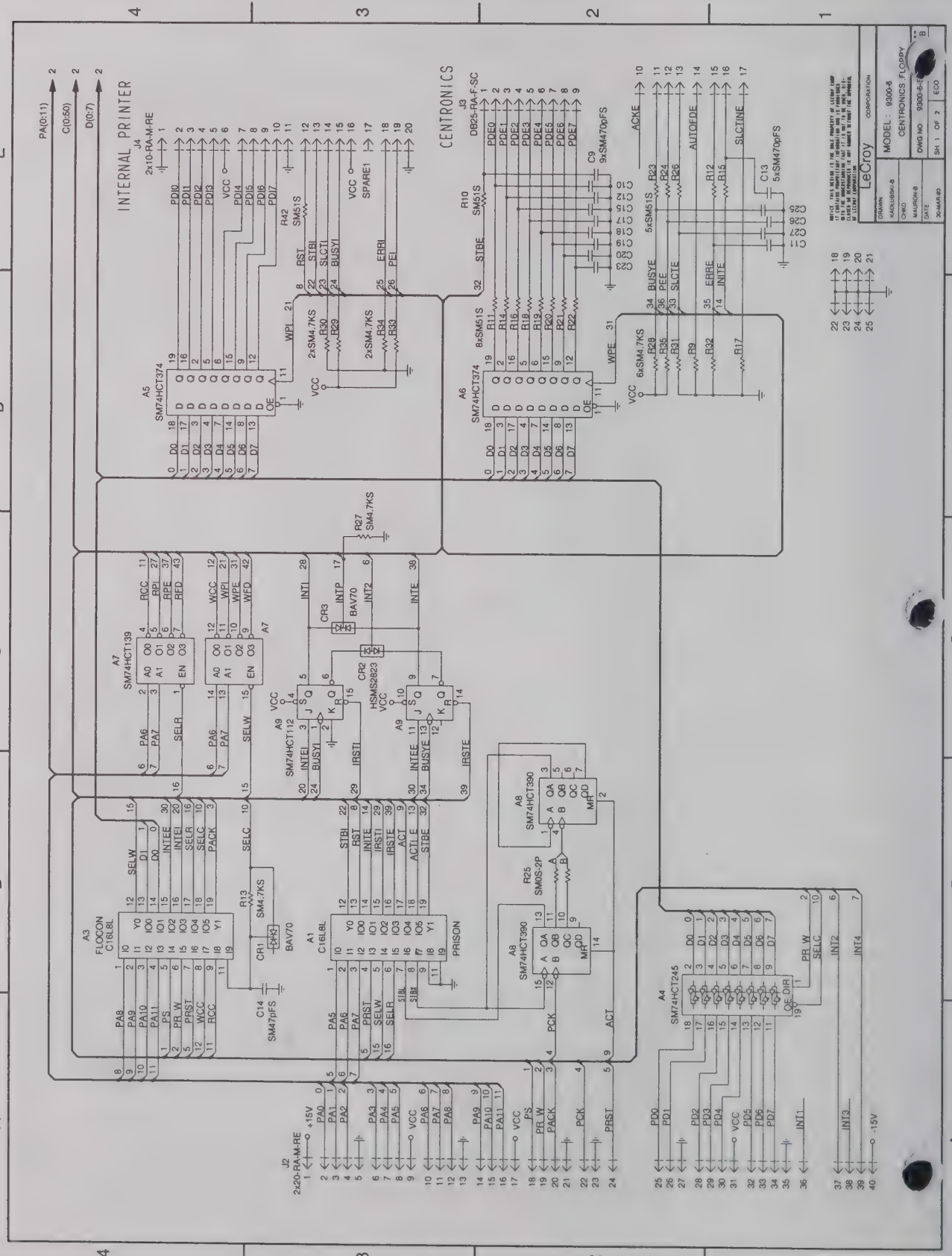

2x8-ST-ZIF
2x8-RA-ZIFGRIP
BAW62
ENCOD-2BIT-E
ENCOD-2BIT-C
10K-SC
10K-6SC
68HC05C4
.1uF
2x10-ST-M-RE

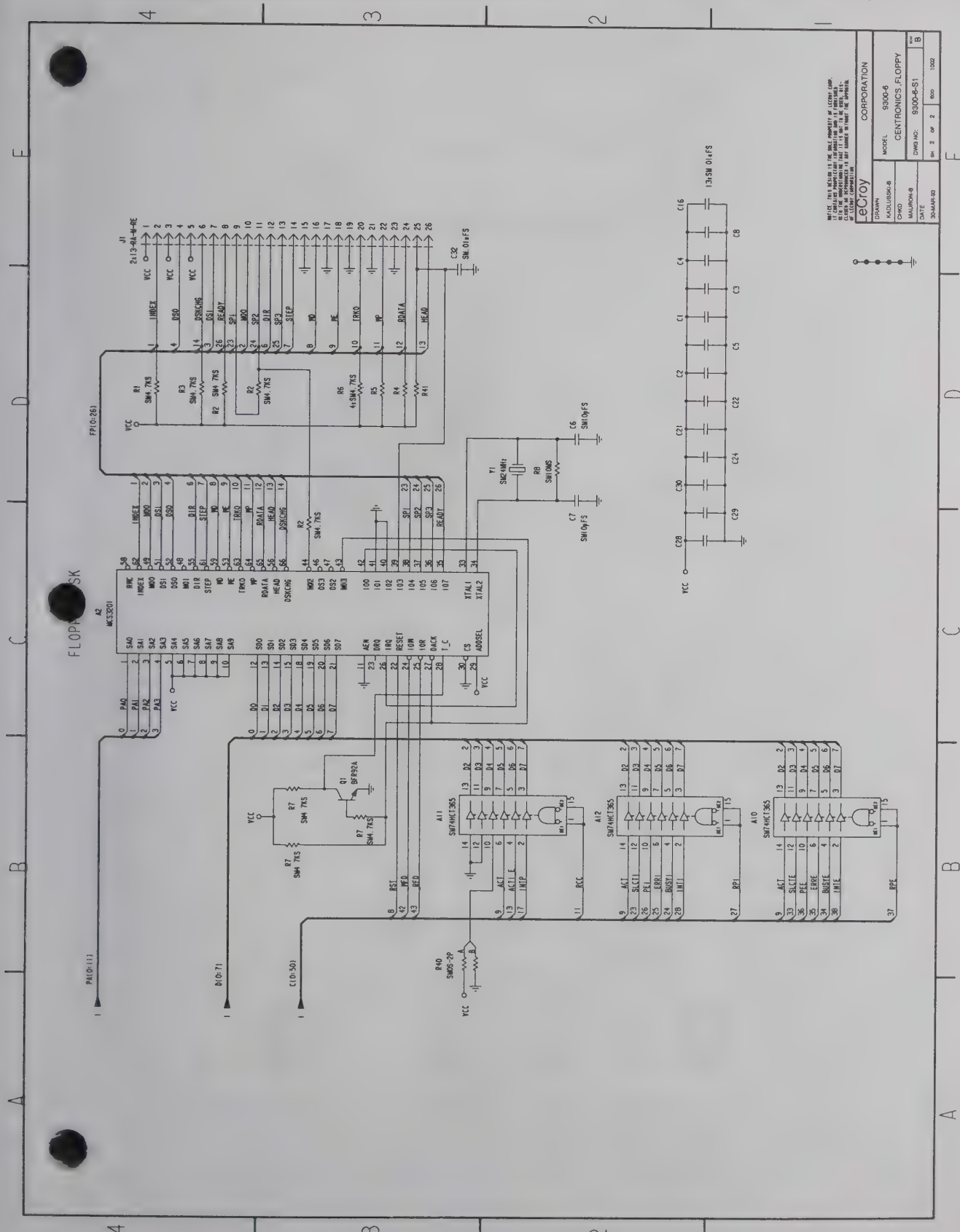
9300-5 Rev:B

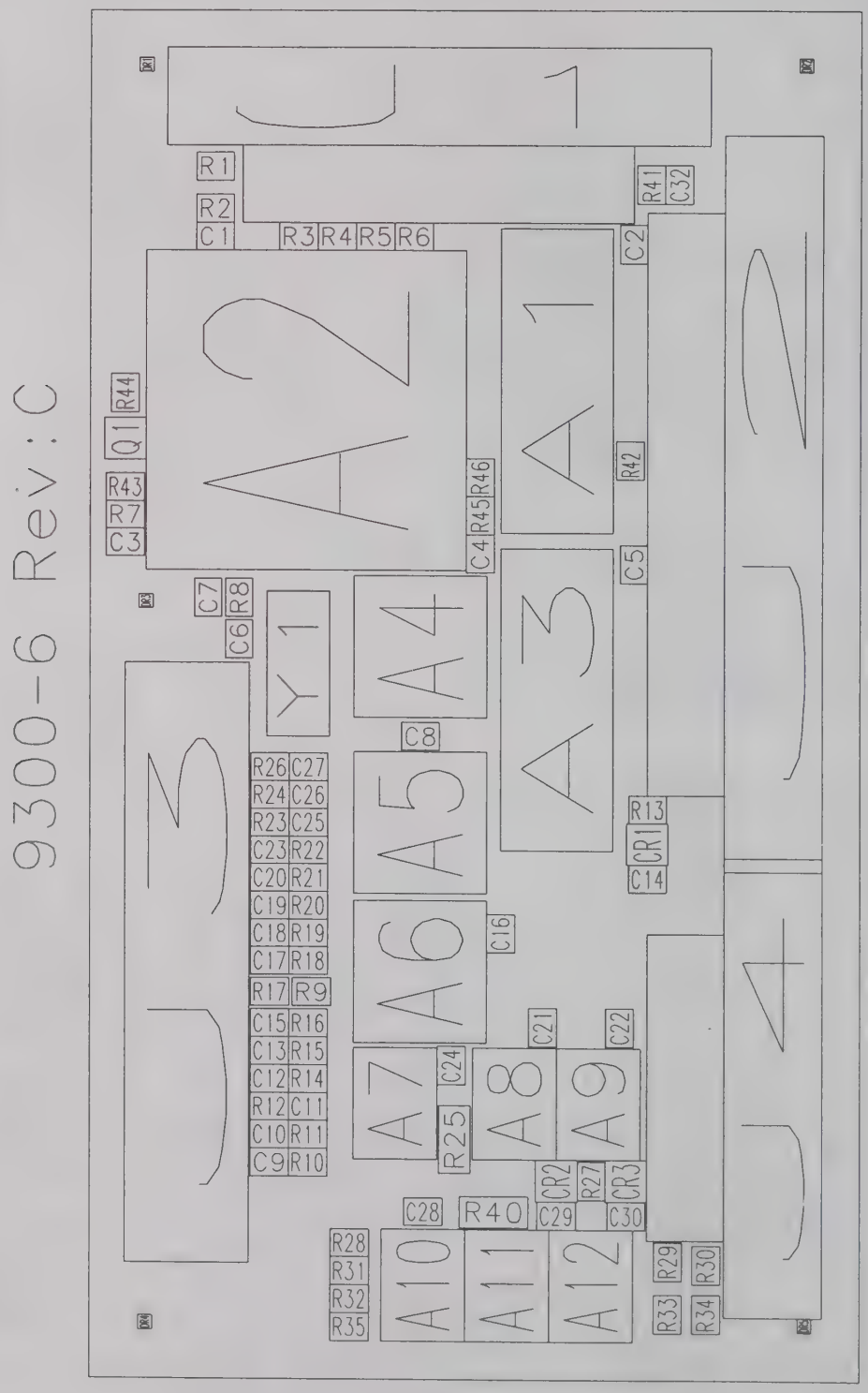
PART: F9350-5 **DESC : Quad Channel Front Panel**

Location	Part Number	Description	Location	Part Number	Description
A1	68HC05C4	68HC05C4	CR15	230020062	BAW62
C1,2,3	103427104	.1uF	CR16	230020062	BAW62
C4	147436033	33uF-16V	CR17	230020062	BAW62
J1	454110120	2x10-ST-M-RE	CR18	230020062	BAW62
J2	453410016	2x8-RA-ZIFGRIP	CR21	230020062	BAW62
J3	453411016	2x8-ST-ZIF	CR22	230020062	BAW62
J10	425100001	ENCOD-2BIT-E	CR23	230020062	BAW62
J76	425100001	ENCOD-2BIT-E	CR24	230020062	BAW62
K10	425110001	ENCOD-2BIT-C	CR25	230020062	BAW62
K32	425100001	ENCOD-2BIT-E	CR26	230020062	BAW62
K76	425110001	ENCOD-2BIT-C	CR29	230020062	BAW62
L10	425100001	ENCOD-2BIT-E	CR30	230020062	BAW62
L32	425100001	ENCOD-2BIT-E	CR31	230020062	BAW62
L76	425100001	ENCOD-2BIT-E	CR32	230020062	BAW62
M10	425100001	ENCOD-2BIT-E	CR37	230020062	BAW62
M32	425110001	ENCOD-2BIT-C	CR38	230020062	BAW62
M76	425100001	ENCOD-2BIT-E	CR39	230020062	BAW62
N10	425110001	ENCOD-2BIT-C	CR40	230020062	BAW62
N32	425100001	ENCOD-2BIT-E	CR41	230020062	BAW62
CR1	230020062	BAW62	CR42	230020062	BAW62
CR2	230020062	BAW62	CR43	230020062	BAW62
CR7	230020062	BAW62	CR44	230020062	BAW62
CR8	230020062	BAW62	CR45	230020062	BAW62
CR9	230020062	BAW62	CR46	230020062	BAW62
CR10	230020062	BAW62	CR47	230020062	BAW62
CR13	230020062	BAW62	CR48	230020062	BAW62
CR14	230020062	BAW62	RN1,2,3	190042103	10K-SC

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
103427104	CAP CERA MONO 100V .1 UF	3
147436033	CAP ALUM METAL CAN 33 UF	1
190042103	RESISTOR NETWORK 10 K	2
190642103	RESISTOR NETWORK 10 K	1
230020062	DIODE SWITCHING BAW62	34
425100001	ENCODER DIGITAL 24 POS	9
425110001	ENCODER DIGITAL 24 POS	4
453410016	CONN FLEX CIRCUIT 16-POS	1
454110120	HDR SLD TAIL/MALE/20/STRAIGHT	1
554435004	SCREW PT PHIL KA35X10	1
7093XX511	KNOB 10MM DIAMETRE	8
7093XX521	KNOB 14MM DIAMETRE	5
719300503	PC BD PREASS'Y 9300-5	1
729350513	FP KEYBOARD ASS'Y 9350-5	1
MFP414	IC FRT PANEL PROCESSOR MFP414	1


INTERNAL PRINTER
CENTRONICS
PRISON
FLOCON
LeCroy
MODEL : 9300-6
CENTRONICS FLOPPY
DWG NO 9300-6-C
SH 1 OF 2
ECO


eCroy
CORPORATION
MODEL 9300-6
CENTRONICS_FLOPPY
DWG NO: 9300-6-S1
DRAWN KADLUBSKI-B
CHKD MAURON-B
DATE 30-MAR-93
SH 2 OF 2
ECO 1002
FLOPPY DISK
A2 MCS3201
A11 SM74HCT365
A12 SM74HCT365
A10 SM74HCT365
Q1 BFR92A
Y1 SM24MHz
R8 SM10MS
R40 SM05-2P
FP(0:26)
J1 2x13-RA-W-RE
PA(0:11)
D(0:7)
C(0:50)
VCC


9300-6 Rev:C
J1
J2
J3
J4
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
Y1
Q1
CR1
CR2
CR3
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R40
R41
R42
R43
R44
R45
R46
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
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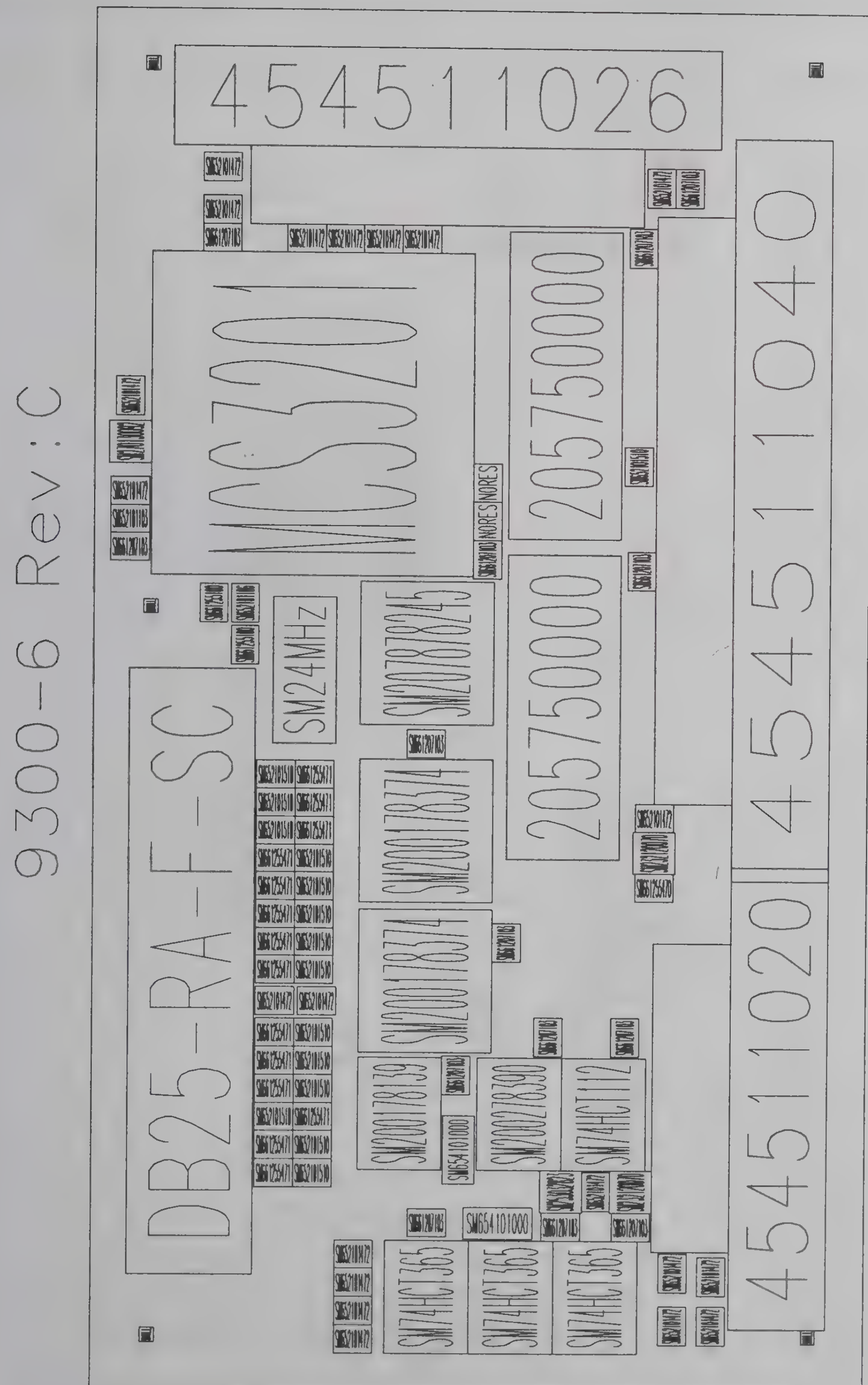
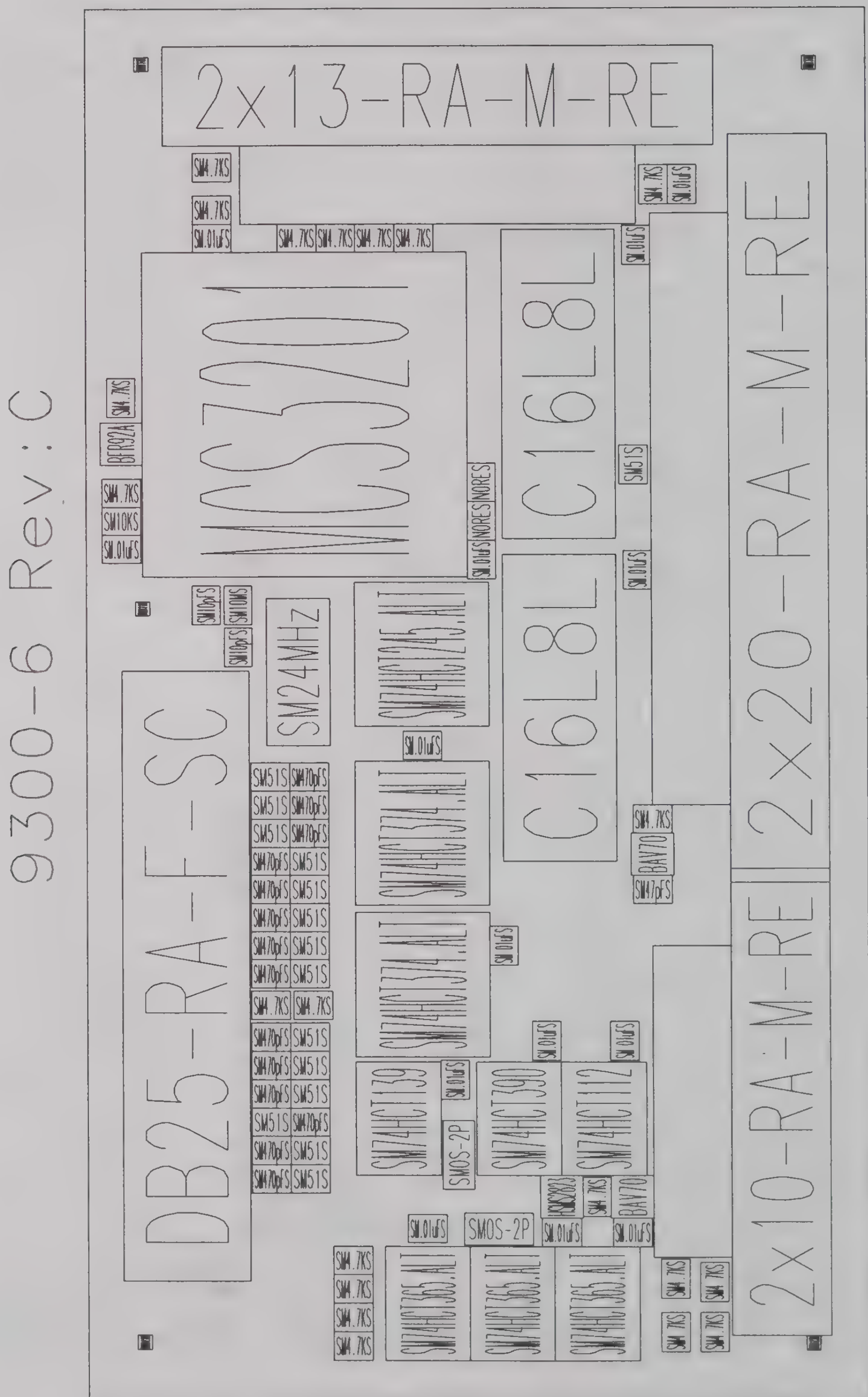
C29
C30
C32


9300-6 Rev:C
454511026
MCS7720
2057500000
2057500000
454511040
SM24MHz
DB25-RA-F-SC
454511020


9300-6 Rev:C
2x13-RA-M-RE
2x20-RA-M-RE
2x10-RA-M-RE
DB25-RA-F-SC
SM24MHz
C16L8L
C16L8L
SMOS-2P
SMOS-2P
BAV70
BAV70

PART: F9300-6 **DESC: CENTRONICS, FLOPPY AND PRINTER INTERFACE**

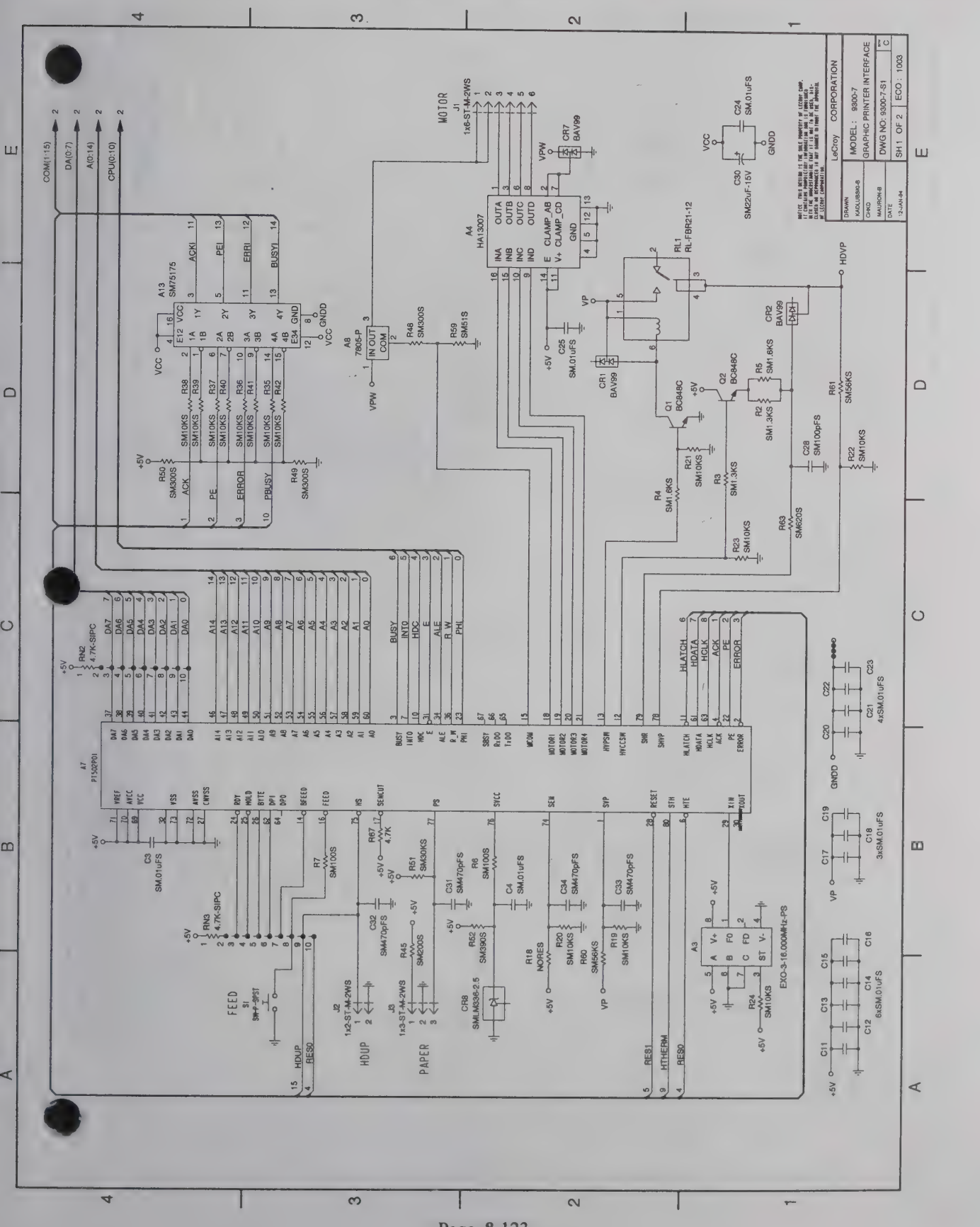
Location	Part Number	Description	Location	Part Number	Description
A1	205750000	C16L8L	CR2	SM253032823	HSMS2823
A2	SM227063201	MCS3201	CR3	SM232120070	BAV70
A3	205750000	C16L8L	J1	454511026	2x13-RA-M-RE
A4	SM207878245	SM74HCT245	J2	454511040	2x20-RA-M-RE
A5	SM200178374	SM74HCT374	J3	454520025	DB25-RA-F-SC
A6	SM200178374	SM74HCT374	J4	454511020	2x10-RA-M-RE
A7	SM200178139	SM74HCT139	Q1	SM270130092	BFR92A
A8	SM200278390	SM74HCT390	R1	SM652101472	SM4.7KS
A9	SM201170112	SM74HCT112	R2	SM652101472	SM4.7KS
A10	SM207170036	SM74HCT365	R3	SM652101472	SM4.7KS
A11	SM207170036	SM74HCT365	R4	SM652101472	SM4.7KS
A12	SM207170036	SM74HCT365	R5	SM652101472	SM4.7KS
C1	SM661207103	SM.01uF	R6	SM652101472	SM4.7KS
C2	SM661207103	SM.01uF	R7	SM652101103	SM10KS
C3	SM661207103	SM.01uF	R8	SM652101106	SM10MS
C4	SM661207103	SM.01uF	R9	SM652101472	SM4.7KS
C5	SM661207103	SM.01uF	R10	SM652101510	SM51S
C6	SM661255100	SM10pF	R11	SM652101510	SM51S
C7	SM661255100	SM10pF	R12	SM652101510	SM51S
C8	SM661207103	SM.01uF	R13	SM652101472	SM4.7KS
C9	SM661255471	SM470pF	R14	SM652101510	SM51S
C10	SM661255471	SM470pF	R15	SM652101510	SM51S
C11	SM661255471	SM470pF	R16	SM652101510	SM51S
C12	SM661255471	SM470pF	R17	SM652101472	SM4.7KS
C13	SM661255471	SM470pF	R18	SM652101510	SM51S
C14	SM661255470	SM47pF	R19	SM652101510	SM51S
C15	SM661255471	SM470pF	R20	SM652101510	SM51S
C16	SM661207103	SM.01uF	R21	SM652101510	SM51S
C17	SM661255471	SM470pF	R22	SM652101510	SM51S
C18	SM661255471	SM470pF	R23	SM652101510	SM51S
C19	SM661255471	SM470pF	R24	SM652101510	SM51S
C20	SM661255471	SM470pF	R25	SM654101000	SM0S-2P
C21	SM661207103	SM.01uF	R26	SM652101510	SM51S
C22	SM661207103	SM.01uF	R27	SM652101472	SM4.7KS
C23	SM661255471	SM470pF	R28	SM652101472	SM4.7KS
C24	SM661207103	SM.01uF	R29	SM652101472	SM4.7KS
C25	SM661255471	SM470pF	R30	SM652101472	SM4.7KS
C26	SM661255471	SM470pF	R31	SM652101472	SM4.7KS
C27	SM661255471	SM470pF	R32	SM652101472	SM4.7KS
C28	SM661207103	SM.01uF	R33	SM652101472	SM4.7KS
C29	SM661207103	SM.01uF	R34	SM652101472	SM4.7KS
C30	SM661207103	SM.01uF	R35	SM652101472	SM4.7KS
C32	SM661207103	SM.01uF	R40	SM654101000	SM0S-2P
CR1	SM232120070	BAV70	R41	SM652101472	SM4.7KS

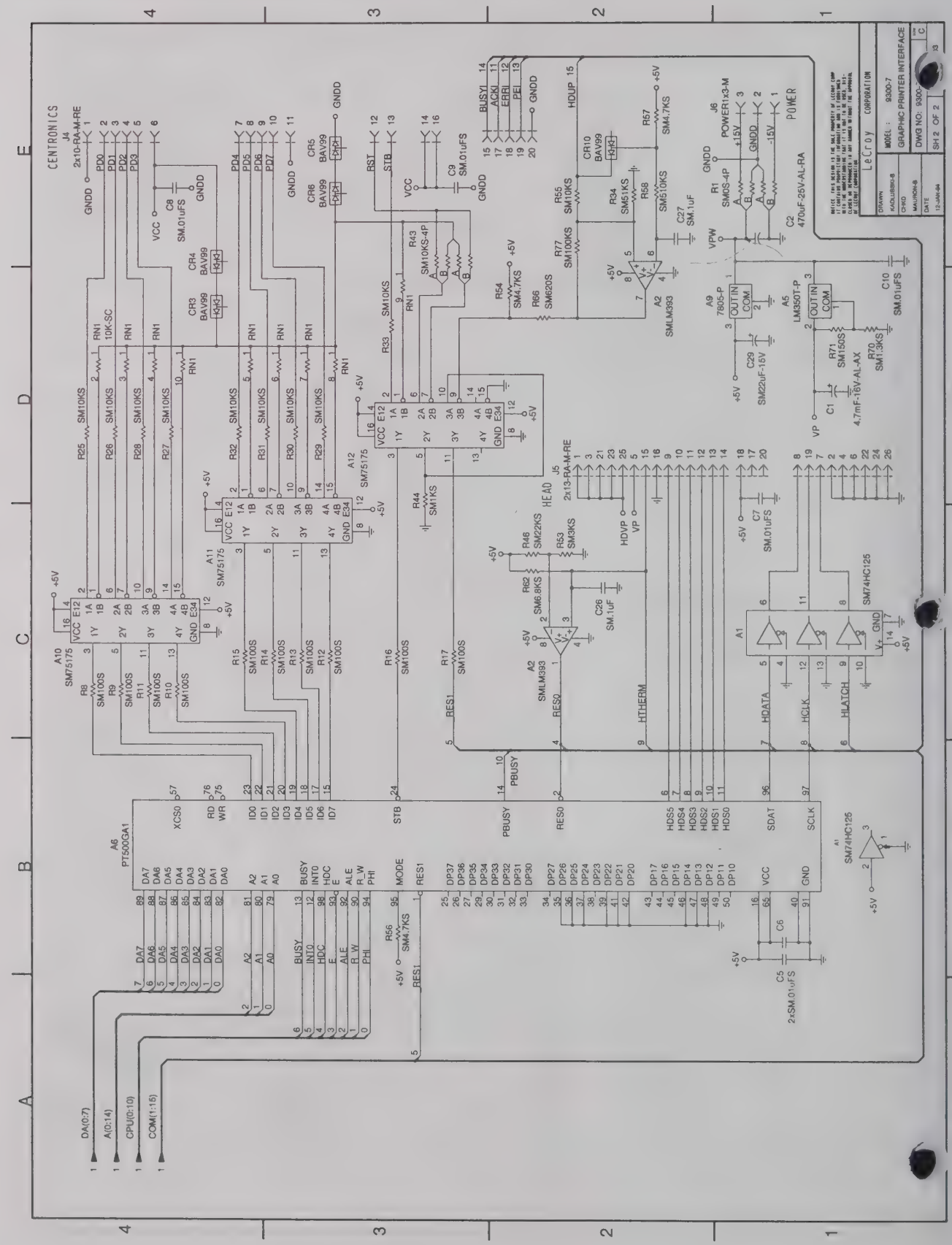
PART: F9300-6 **DESC: CENTRONICS/FLOPPY/PRINTER INTERFACE**

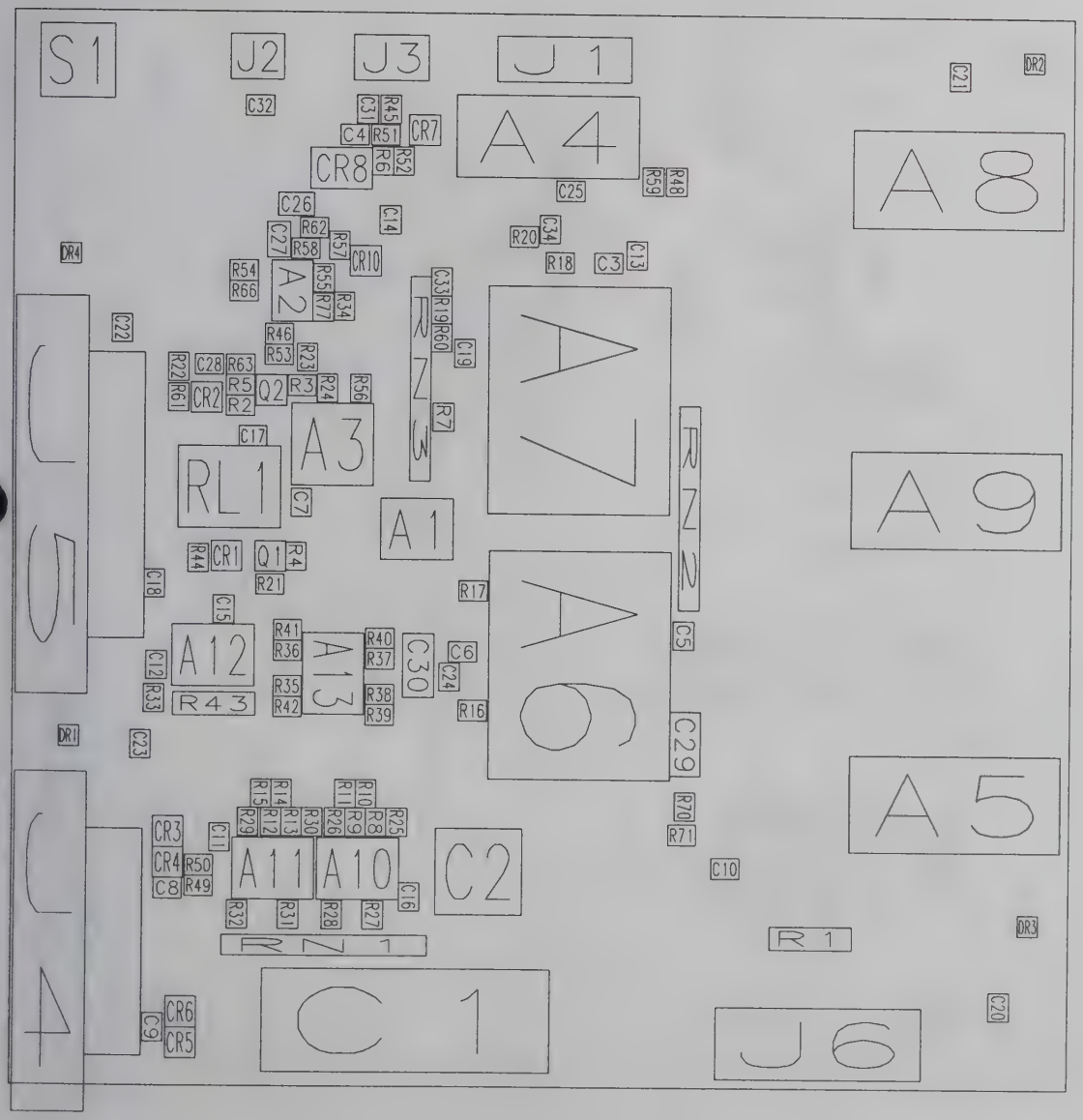
Location	Part Number	Description
R42	SM652101510	SM51S
R43	SM652101472	SM4.7KS
R44	SM652101472	SM4.7KS
Y1	SM310900024	SM24MHz

PART: F9300-6 **DESC: CENTRONICS/FLOPPY/PRINTER INTERFACE**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205750000	IC AND-OR GATE ARRAY 16V8	2
454511020	HDR SOLD TAIL/MALE 20	1
454511026	HDR SOLD TAIL/MALE 26	1
454511040	HDR SOLD TAIL/MALE/40/RT	1
454520025	CONN RT ANGLE FEM 25 S-CLIP	1
455980002	MOUNTING HDW FOR CONN SHELL	2
550430106	SCREW CYL HD PHIL M3X6	4
551430400	WASHER SHAKEPROOF M3	4
709300611	CENTR. FLOPPY INTERF. BRACKET	1
709300621	LABEL PARA-INTERF. CENTRONICS	1
719300603	PC BD PREASS'Y 9300-6 C	1
SM200178139	IC 2-TO-4-LINE DEC HCT139	1
SM200178374	IC D-TYP FLOP 74HCT374	2
SM200278390	IC 4-BIT RIPPLE COUNTER	1
SM201170112	IC DUAL JK FF WITH SET-RESET	1
SM207170036	IC HEX BUFFER 3-STATE	3
SM207878245	IC BUS TRANSCVR HCT 245	1
SM227063201	IC IBM PC FLOPPY DISK CONTR.	1
SM232120070	DIODE ARRAY BAV70	1
SM253032823	DIODE SCHOTTKY 2823	1
SM270130092	TRANSISTOR NPN BFR92A	1
SM310900024	CRYSTAL 24 MHZ SMD	1
SM652101103	RES CHIP (E24) 1% 10 K	1
SM652101106	RES CHIP (E24) 1% 10 MEG	1
SM652101472	RES CHIP (E24) 1% 4.7 K	21
SM652101510	RES CHIP (E24) 1% 51 OHMS	15
SM654101000	CHIP JUMPER ZERO OHMS	2
SM661207103	CAP CERA CHIP 20% .01UF	14
SM661255100	CAP CERA CHIP 10PF	2
SM661255470	CAP CERA CHIP 47PF	1
SM661255471	CAP CERA CHIP 5% 470 PF	14


LeCroy CORPORATION
MODEL : 9300-7
GRAPHIC PRINTER INTERFACE
DWG NO: 9300-7-S1
SH 1 OF 2
ECO : 1003
DRAWN
CHKD
DATE
12-JAN-94
MOTOR
J1
1x6-ST-M-2WS
A4
HA13007
A13
SM75175
A8
7805-P
A7
PT502P01
A3
EXO-3-16.000MHz-PS
RL1
RL-FBR21-12
Q1
BC848C
Q2
BC848C
CR1
BAV99
CR2
BAV99
CR7
BAV99
CR8
SMLM336-2.5
FEED
HDUP
PAPER
COM(1:15)
DA(0:7)
A(0:14)
CPU(0:10)
HDVP
VCC
GNDD
VPW
+5V


CENTRONICS
J4
2x10-RA-M-RE
POWER
J6
POWER1x3-M
HEAD
J5
2x13-RA-M-RE
A6
PT500GA1
A10
SM75175
A11
SM75175
A12
SM75175
A2
SMLM393
A1
SM74HC125
A9
7805-P
A5
LM350T-P
DA(0:7)
A(0:14)
CPU(0:10)
COM(1:15)
LeCroy CORPORATION
MODEL : 9300-7
GRAPHIC PRINTER INTERFACE
DWG NO: 9300-
SH 2 OF 2


9300-7 Rev:C
S1
J2
J3
J1
A4
A8
A7
A9
A6
A5
A3
A1
A2
A12
A13
A11
A10
C2
C1
J6
J5
J4
RL1
RN1
RN2
RN3
R1
C29
C30
C32
C21
DR2
DR4
DR1
DR3
C22
C18
C23
C10
C20
C9
C17
C7
C15
C12
C11
C16
C25
C14
C3
C13
C19
C5
C6
C24
C8
C4
C26
C27
C28
C31
C34
C33
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
C22
C23
C24
C25
C26
C27
C28
C29
C30
C31
C32
C33
C34
CR1
CR2
CR3
CR4
CR5
CR6
CR7
CR8
CR10
Q1
Q2
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
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R28
R29
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R31
R32
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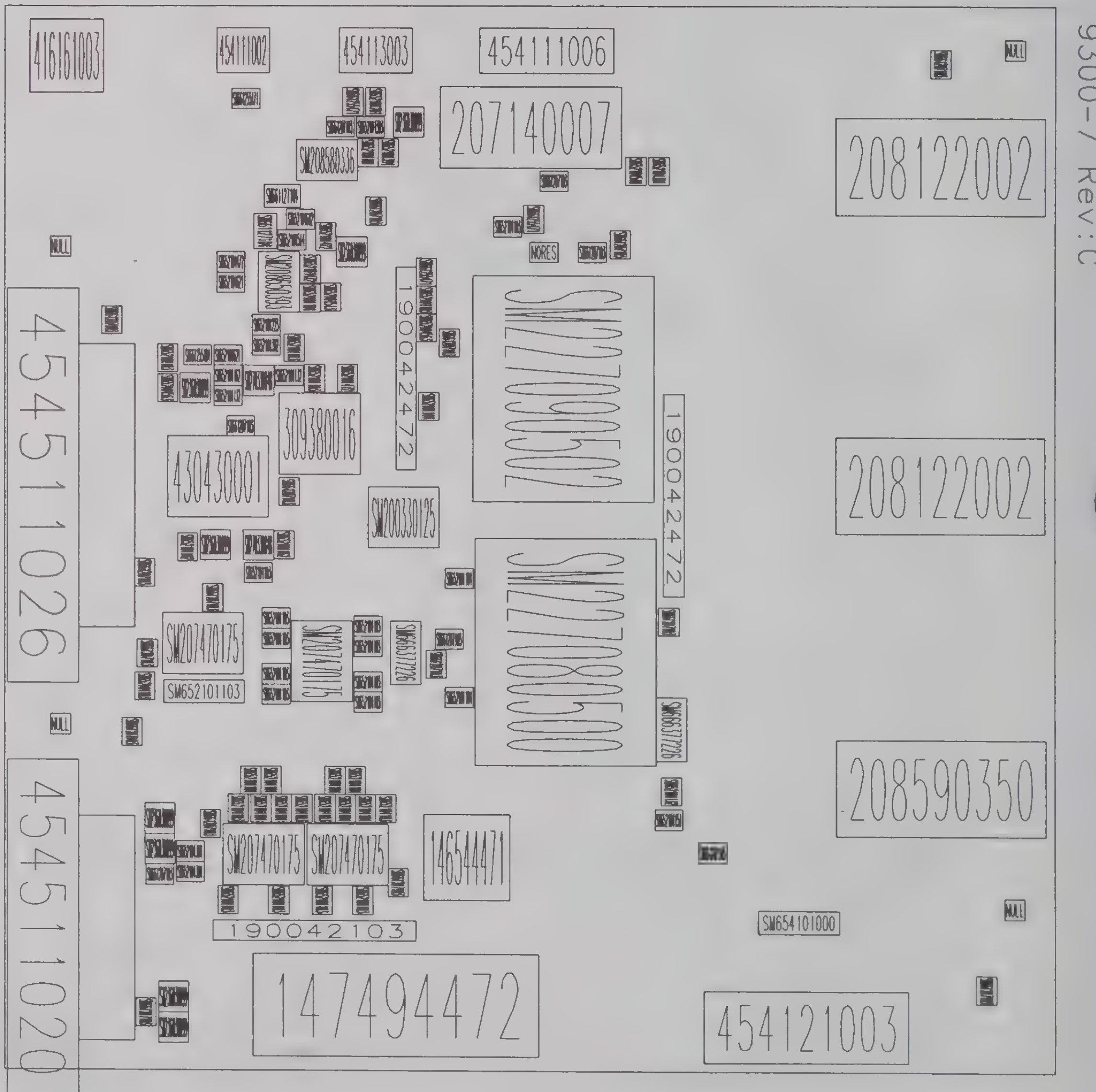
R77


9300-7 Rev:C
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454111006
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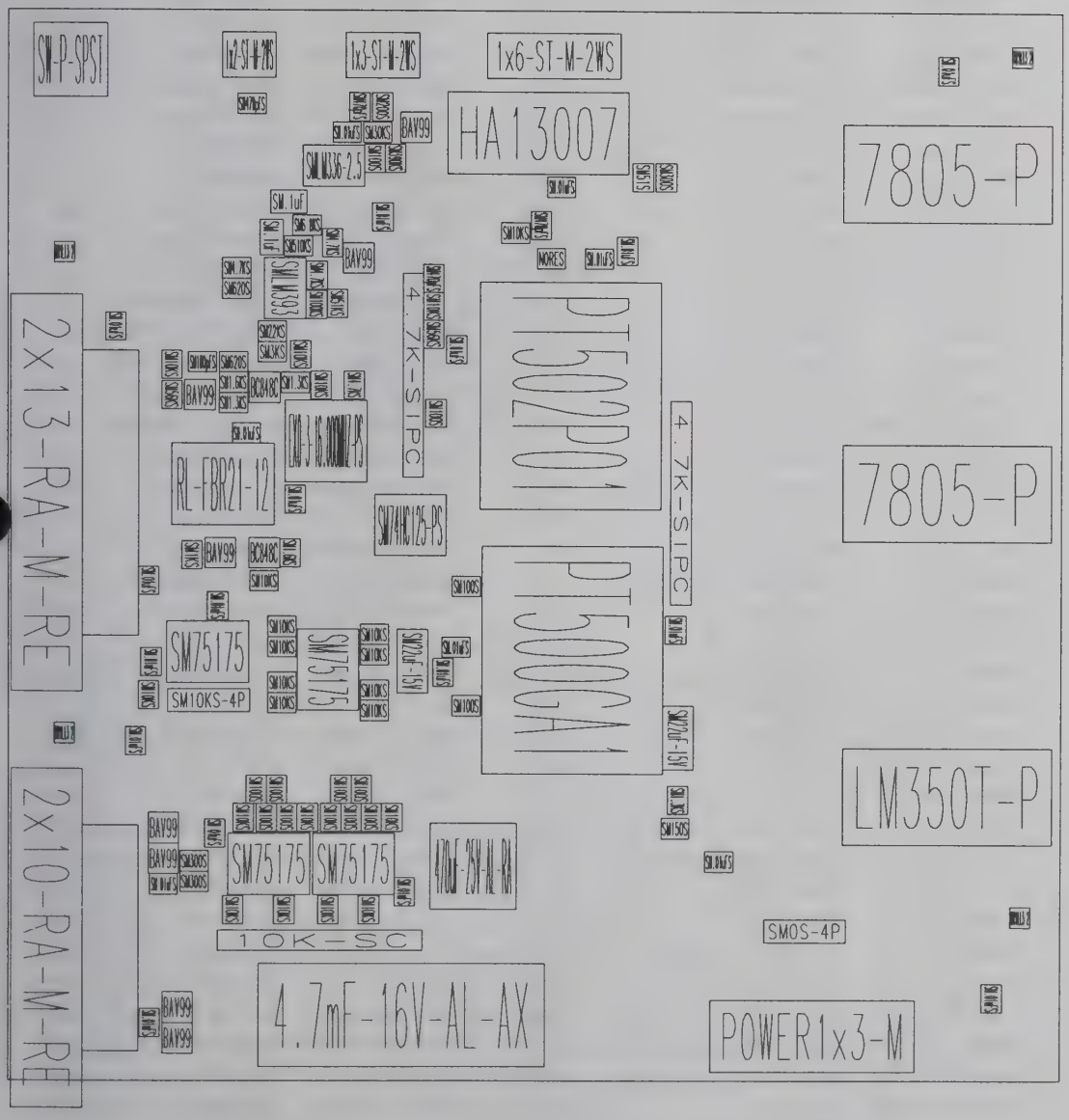
208122002
208122002
208590350
454511026
454511020
309380016
430430001
190042472
190042472
SM227090502
SM227080500
SM200330125
SM208580336
SM207470175
SM207470175
SM207470175
SM207470175
SM652101103
SM663372226
SM663372226
146544471
190042103
147494472
454121003
SM654101000
NORES
NULL


9300-7 Rev:C
SW-P-SPST
1x2-ST-M-2WS
1x3-ST-M-2WS
1x6-ST-M-2WS
HA13007
7805-P
7805-P
LM350T-P
2x13-RA-M-RE
2x10-RA-M-RE
RL-FBR21-12
SM75175
SM10KS-4P
SM75175
SM75175
SM75175
SM74HC125-PS
PT502P01
PT500GA1
4.7K-SIPC
4.7K-SIPC
10K-SC
4.7mF-16V-AL-AX
SMOS-4P
POWER1x3-M
BAV99
BC848C
NORES
SM.1uF
SM22uF-15V
SM100S
SM150S

PART: F9300-7 **DESC: LTP 5446 PRINTER CONTROLLER**

Location	Part Number	Description	Location	Part Number	Description
A1	SM200330125	SM74HC125	C32	SM661255471	SM470pF
A2	SM208650393	SMLM393	C33	SM661255471	SM470pF
A3	309380016	16.000MHZ	C34	SM661255471	SM470pF
A4	207140007	HA13007	CR1	SM236030099	BAV99
A5	208590350	LM350T-P	CR2	SM236030099	BAV99
A6	SM227080500	PT500GA1	CR3	SM236030099	BAV99
A7	SM227090501	PT501P01	CR4	SM236030099	BAV99
A8	208122002	7805-P	CR5	SM236030099	BAV99
A9	208122002	7805-P	CR6	SM236030099	BAV99
A10	SM207470175	SM75175	CR7	SM236030099	BAV99
A11	SM207470175	SM75175	CR8	SM208580336	SMLM336-2.5
A12	SM207470175	SM75175	CR10	SM236030099	BAV99
A13	SM207470175	SM75175	J1	454111006	1x6-ST-M-2WS
C1	147494472	4.7mF-16V	J2	454111002	1x2-ST-M-2WS
C2	146544471	470uF-25V	J3	454113003	1x3-ST-M-2WS
C3	SM661207103	SM.01uF	J4	454511020	2x10-RA-M-RE
C4	SM661207103	SM.01uF	J5	454511026	2x13-RA-M-RE
C5	SM661207103	SM.01uF	J6	454121003	POWER1x3-M
C6	SM661207103	SM.01uF	Q1	SM270330848	BC848C
C7	SM661207103	SM.01uF	Q2	SM270330848	BC848C
C8	SM661207103	SM.01uF	R1	SM654101000	SM0S-4P
C9	SM661207103	SM.01uF	R2	SM652101132	SM1.3KS
C10	SM661207103	SM.01uF	R3	SM652101132	SM1.3KS
C11	SM661207103	SM.01uF	R4	SM652101162	SM1.6KS
C12	SM661207103	SM.01uF	R5	SM652101162	SM1.6KS
C13	SM661207103	SM.01uF	R6	SM652101101	SM100S
C14	SM661207103	SM.01uF	R7	SM652101101	SM100S
C15	SM661207103	SM.01uF	R8	SM652101101	SM100S
C16	SM661207103	SM.01uF	R9	SM652101101	SM100S
C17	SM661207103	SM.01uF	R10	SM652101101	SM100S
C18	SM661207103	SM.01uF	R11	SM652101101	SM100S
C19	SM661207103	SM.01uF	R12	SM652101101	SM100S
C20	SM661207103	SM.01uF	R13	SM652101101	SM100S
C21	SM661207103	SM.01uF	R14	SM652101101	SM100S
C22	SM661207103	SM.01uF	R15	SM652101101	SM100S
C23	SM661207103	SM.01uF	R16	SM652101101	SM100S
C24	SM661207103	SM.01uF	R17	SM652101101	SM100S
C25	SM661207103	SM.01uF	R19	SM652101103	SM10KS
C26	SM661127104	SM.1uF	R20	SM652101103	SM10KS
C27	SM661127104	SM.1uF	R21	SM652101103	SM10KS
C28	SM661255101	SM100pF	R22	SM652101103	SM10KS
C29	SM666377226	SM22uF-15V	R23	SM652101103	SM10KS
C30	SM666377226	SM22uF-15V	R24	SM652101103	SM10KS
C31	SM661255471	SM470pF	R25	SM652101103	SM10KS

PART: F9300-7 **DESC: LTP 5446 PRINTER CONTROLLER**

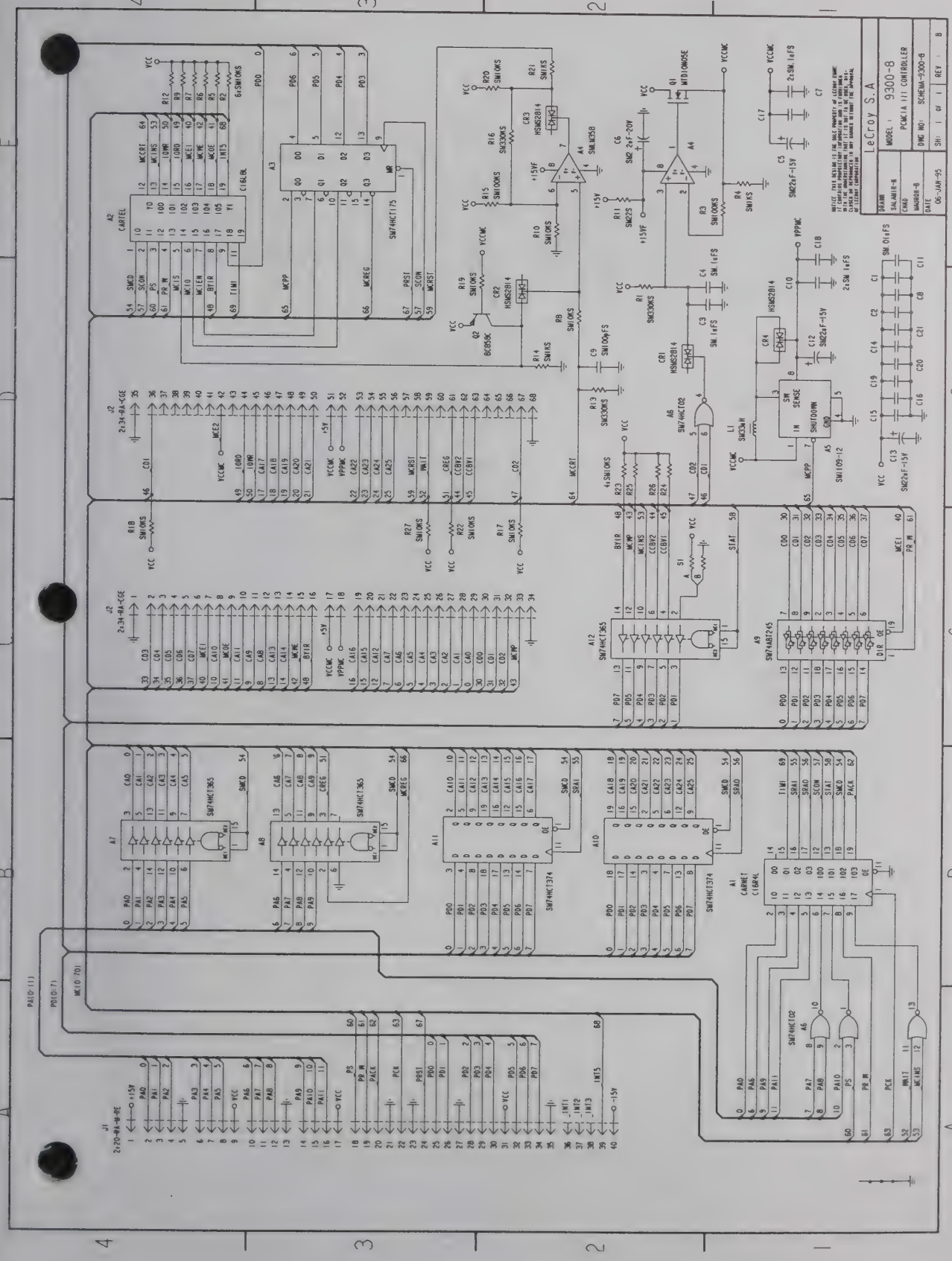
Location	Part Number	Description	Location	Part Number	Description
R26	SM652101103	SM10KS	R50	SM652101301	SM300S
R27	SM652101103	SM10KS	R51	SM652101303	SM30KS
R28	SM652101103	SM10KS	R52	SM652101391	SM390S
R29	SM652101103	SM10KS	R53	SM652101302	SM3KS
R30	SM652101103	SM10KS	R54	SM652101472	SM4.7KS
R31	SM652101103	SM10KS	R55	SM652101103	SM10KS
R32	SM652101103	SM10KS	R56	SM652101472	SM4.7KS
R33	SM652101103	SM10KS	R57	SM652101472	SM4.7KS
R34	SM652101513	SM51KS	R58	SM652101514	SM510KS
R35	SM652101103	SM10KS	R59	SM652101510	SM51S
R36	SM652101103	SM10KS	R60	SM652101563	SM56KS
R37	SM652101103	SM10KS	R61	SM652101563	SM56KS
R38	SM652101103	SM10KS	R62	SM652101682	SM6.8KS
R39	SM652101103	SM10KS	R63	SM652101621	SM620S
R40	SM652101103	SM10KS	R66	SM652101621	SM620S
R41	SM652101103	SM10KS	R70	SM652101132	SM1.3KS
R42	SM652101103	SM10KS	R71	SM652101151	SM150S
R43	SM652101103	SM10KS-4P	R77	SM652101104	SM100KS
R44	SM652101102	SM1KS	RL1	430430001	RL-FBR21-12
R45	SM652101201	SM200S	RN1	190042103	10K-SC
R46	SM652101223	SM22KS	RN2	190042472	4.7K-SIPC
R48	SM652101301	SM300S	RN3	190042472	4.7K-SIPC
R49	SM652101301	SM300S	S1	416161003	SW-P-SPST

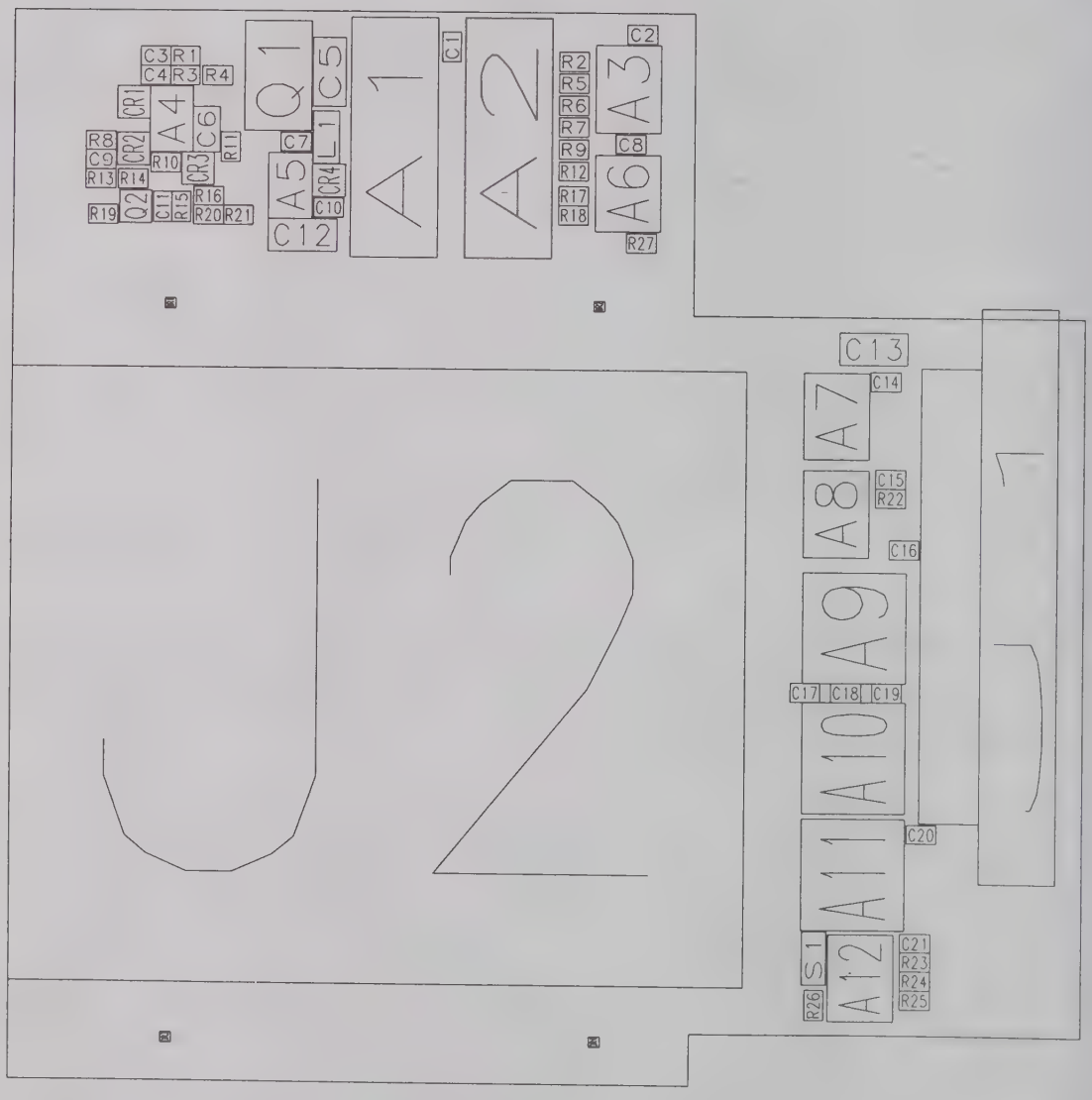
PART: F9300-7 **DESC: LTP 5446 PRINTER CONTROLLER**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
146544471	CAP MINI ALUM 20% 470UF	1
147494472	CAP ALU COMPACT AXIAL 4700 UF	1
190042103	RESISTOR NETWORK 10 K	1
190042472	RESISTOR NETWORK 4.7 K	2
207140007	IC QUAD STEP MOTOR DRIVER	1
208122002	IC VOLT REG POS UA7805	2
208590350	IC ADJ POWER REG 3A LM350	1
309380016	CRYSTAL OSC (PROGR) 16 MHZ	1
416161003	SWITCH PUSHBUTTON SPST	1
430430002	RELAY 1 FORM C SPDT	1
454111002	HEADER STRAIGHT 2-PINS	1
454111006	HEADER STRAIGHT 6-PINS	1
454113003	HEADER STRAIGHT 3-PINS	1
454121003	BLOC FOR SOCKETS 3-PIN	1
454511020	HDR SOLD TAIL/MALE 20	1

PART: F9300-7 **DESC: LTP 5446 PRINTER CONTROLLER**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
454511026	HDR SOLD TAIL/MALE 26	1
554435401	RIVET "RIVSCREW" M 3.5	3
719300703	PC BD PREASS'Y 9300-7	1
SM200330125	IC QUAD BUFFER 74HC125	1
SM207470175	IC QUAD DIFF LINE RECEIVER	4
SM208580336	IC REF DIODE LM336-2.5V	1
SM208650393	IC DUAL VOLT COMP LM393M	1
SM227080500	IC THERM PRINTER GATE ARRAY	1
SM227090501	IC THERM PRINTER CPU	1
SM236030099	DIODE SO-PKG BAV99	8
SM270330848	TRANSISTOR NPN BC848C	2
SM652101101	RES CHIP (E24) 1% 100 OHM	12
SM652101102	RES CHIP (E24) 1% 1 K	1
SM652101103	RES CHIP (E24) 1% 10 K	25
SM652101104	RES CHIP (E24) 1% 100 K	1
SM652101132	RES CHIP (E24) 1% 1.3 K	3
SM652101151	RES CHIP (E24) 1% 150 OHM	1
SM652101162	RES CHIP (E24) 1% 1.6 K	2
SM652101201	RES CHIP (E24) 1% 200 OHM	1
SM652101223	RES CHIP (E24) 1% 22 K	1
SM652101301	RES CHIP (E24) 1% 300 OHM	3
SM652101302	RES CHIP (E24) 1% 3 K	1
SM652101303	RES CHIP (E24) 1% 30 K	1
SM652101391	RES CHIP (E24) 1% 390 OHM	1
SM652101472	RES CHIP (E24) 1% 4.7 K	3
SM652101510	RES CHIP (E24) 1% 51 OHMS	1
SM652101513	RES CHIP (E24) 1% 51 K	1
SM652101514	RES CHIP (E24) 1% 510 K	1
SM652101563	RES CHIP (E24) 1% 56 K	2
SM652101621	RES CHIP (E24) 1% 620 OHM	2
SM652101682	RES CHIP (E24) 1% 6.8 K	1
SM654101000	CHIP JUMPER ZERO OHMS	1
SM661127104	CAP CERA CHIP 20% .1 UF	2
SM661207103	CAP CERA CHIP 20% .01UF	23
SM661255101	CAP CERA CHIP 5% 100 PF	1
SM661255471	CAP CERA CHIP 5% 470 PF	4
SM666377226	CAP MOLD TANT CHIP 22 UF	2




C3
R1
C4
R3
R4
CR1
A4
C6
R8
C9
CR2
R10
CR3
R11
R13
R14
Q2
C11
R15
R16
R19
R20
R21
Q1
C5
C7
L1
A5
CR4
C10
C12
A1
C1
A2
R2
R5
R6
R7
R9
R12
R17
R18
C2
A3
C8
A6
R27
J2
C13
C14
A7
A8
C15
R22
C16
A9
C17
C18
C19
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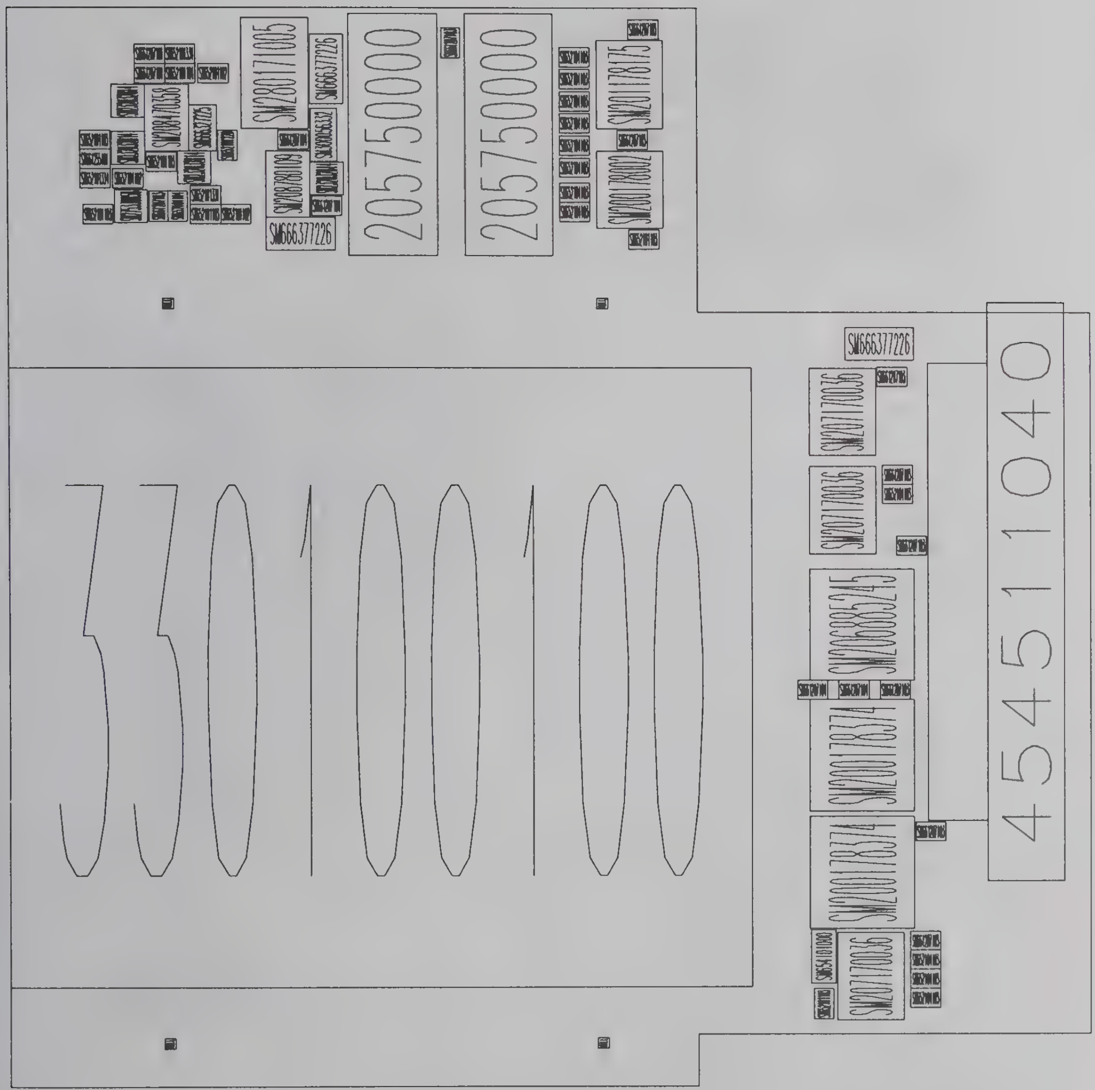
A11
C20
S1
A12
R26
C21
R23
R24
R25
J1

9300-8 Rev:B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SM666377226
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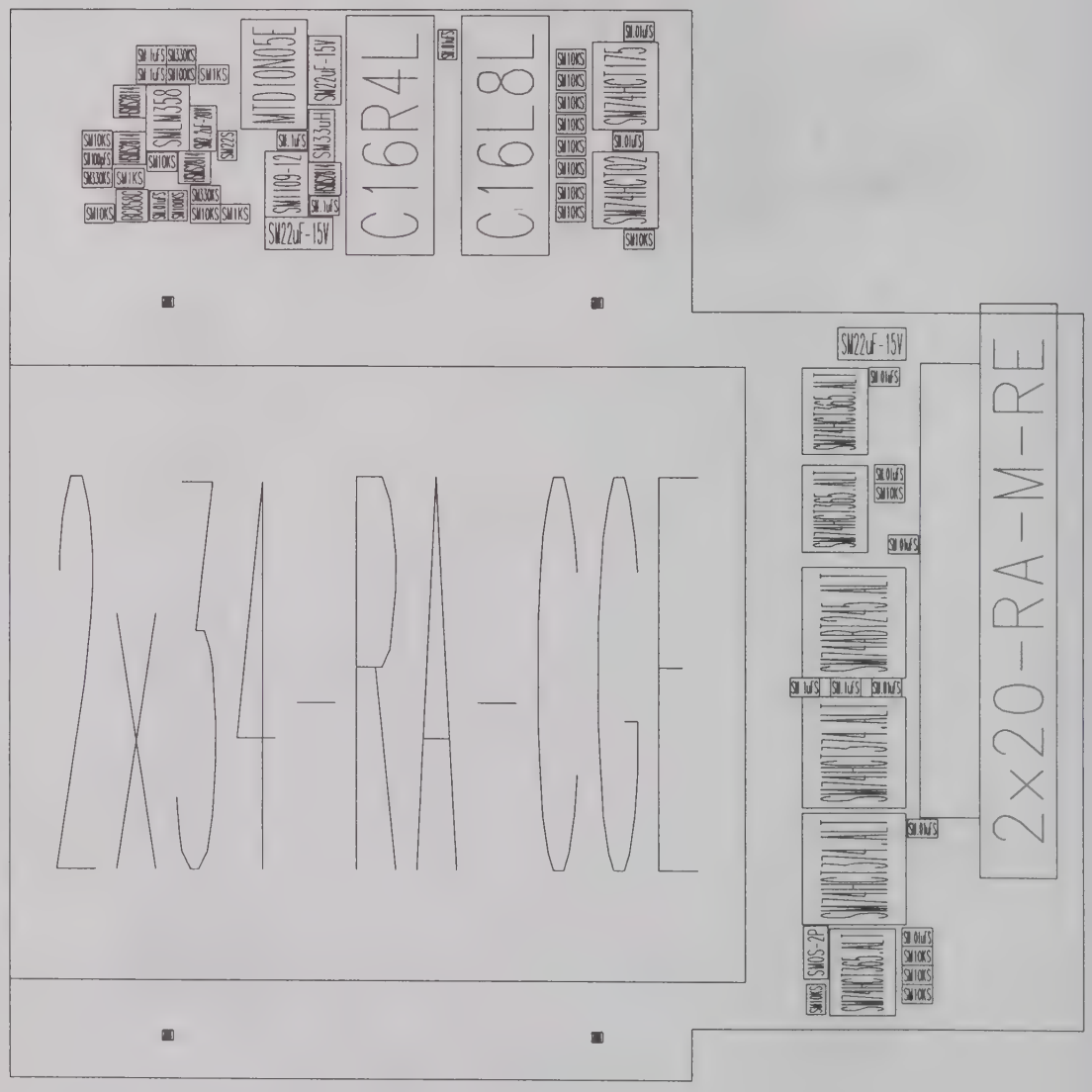
SM666377226

9300-8 Rev:B



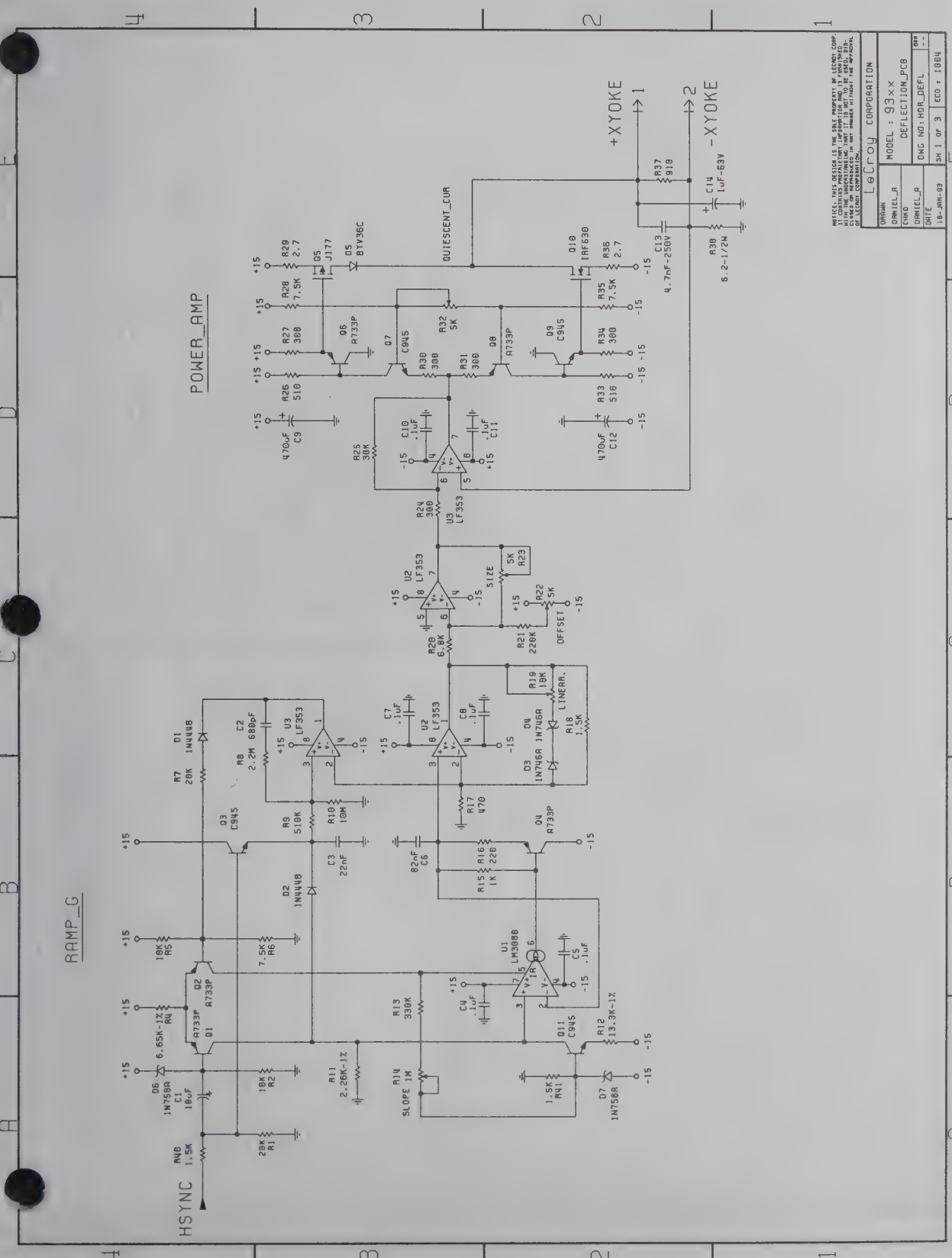
9300-8 Rev:B

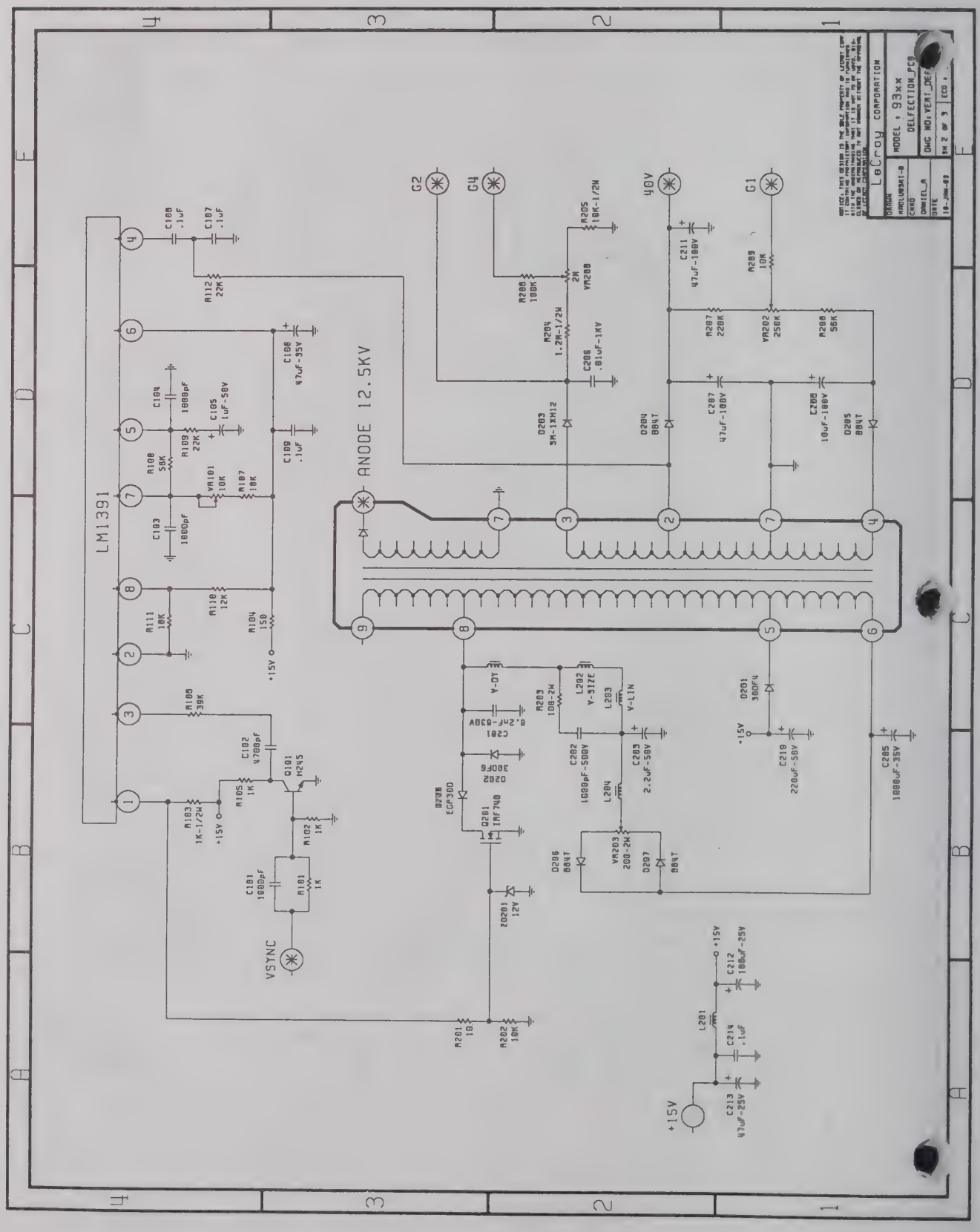
PART: F9300-8 **DESC: PCMCIA 3 HARD DISK CONTROLLER**

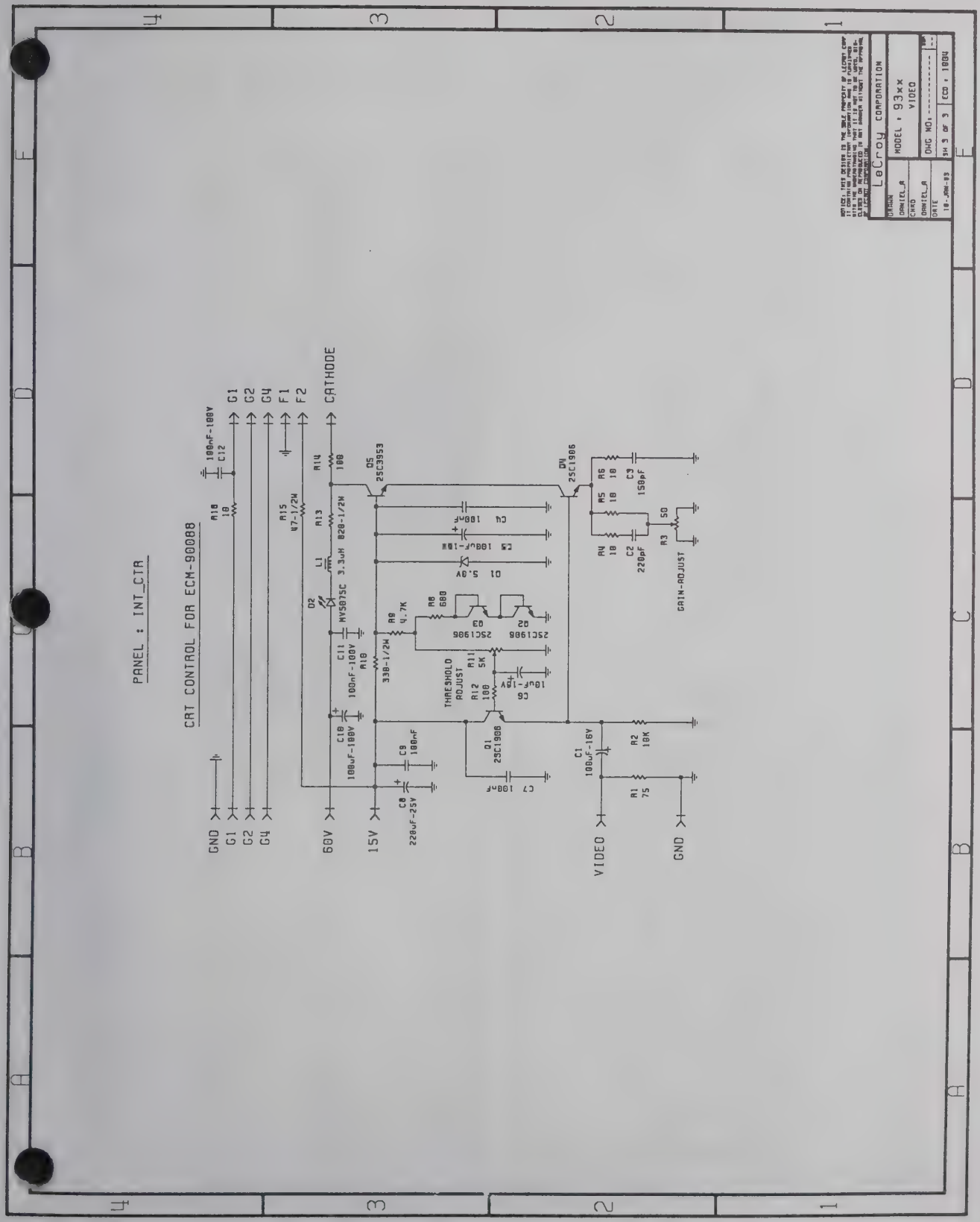
Location	Part Number	Description
A1	205750000	C16R4L
A2	205750000	C16L8L
A3	SM201178175	SM74HCT175
A4	SM208470358	SMLM358
A5	SM208780109	SM1109-12
A6	SM200178002	SM74HCT02
A7	SM207170036	SM74HCT365
A8	SM207170036	SM74HCT365
A9	SM206885245	SM74ABT245
A10	SM200178374	SM74HCT374
A11	SM200178374	SM74HCT374
A12	SM207170036	SM74HCT365
C1	SM661207103	SM.01uFS
C2	SM661207103	SM.01uFS
C3	SM661207104	SM.1uFS
C4	SM661207104	SM.1uFS
C5	SM666377226	SM22uF-15V
C6	SM666327225	SM2.2uF-20V
C7	SM661207104	SM.1uFS
C8	SM661207103	SM.01uFS
C9	SM661255101	SM100pFS
C10	SM661207104	SM.1uFS
C11	SM661207103	SM.01uFS
C12	SM666377226	SM22uF-15V
C13	SM666377226	SM22uF-15V
C14	SM661207103	SM.01uFS
C15	SM661207103	SM.01uFS
C16	SM661207103	SM.01uFS
C17	SM661207104	SM.1uFS
C18	SM661207104	SM.1uFS
C19	SM661207103	SM.01uFS
C20	SM661207103	SM.01uFS
C21	SM661207103	SM.01uFS
J1	454511040	2x20-RA-M-RE
J2	330100100	2x34-RA-CGE
L1	SM300056332	SM33uH
Q1	SM280171005	MTD10N05E
Q2	SM275330858	BC858C
R1	SM652101334	SM330KS
R2	SM652101103	SM10KS
R3	SM652101104	SM100KS
R4	SM652101102	SM1KS
R5	SM652101103	SM10KS
R6	SM652101103	SM10KS
R7	SM652101103	SM10KS
R8	SM652101103	SM10KS
R9	SM652101103	SM10KS
R10	SM652101103	SM10KS
R11	SM652101220	SM22S
R12	SM652101103	SM10KS
R13	SM652101334	SM330KS
R14	SM652101102	SM1KS
R15	SM652101104	SM100KS
R16	SM652101334	SM330KS
R17	SM652101103	SM10KS
R18	SM652101103	SM10KS
R19	SM652101103	SM10KS
R20	SM652101103	SM10KS
R21	SM652101102	SM1KS
R22	SM652101103	SM10KS
R23	SM652101103	SM10KS
R24	SM652101103	SM10KS
R25	SM652101103	SM10KS
R26	SM652101103	SM10KS
R27	SM652101103	SM10KS
S1	SM654101000	SM0S-2P
CR1	SM232032814	HSMS2814
CR2	SM232032814	HSMS2814
CR3	SM232032814	HSMS2814
CR4	SM232032814	HSMS2814

PART: F9300-8 **DESC: PCMCIA III HARD DISK CONTROLLER**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205750000	IC AND-OR GATE ARRAY 16V8	2
330100100	PCMCIA HEADER ASS'Y TOP/LEFT	1
389340009	AUTO-ADHES. RUBBER BAND	1
454511040	HDR SOLD TAIL/MALE/40/RT	1
550120606	SCREW OVAL HD PHIL M2X6	4
550430106	SCREW CYL HD PHIL M3X6	4
551430400	WASHER SHAKEPROOF M3	4
552120100	NUT HEX M2X0.5D	4
594230002	CABLE CLIP ADHESIVE BACK	1
709300811	9300-8 PCMCIA III CONT.BRACKET	1
709300821	9300-8 PCMCIA III CONT. COVER	1
709300831	9300-8 PCMCIA III CONTR. LABEL	1
719300803	PC BD PREASS'Y 9300-8	1
SM200178002	IC 2-INPUT NOR HCT02	1
SM200178374	IC D-TYP FLOP 74HCT374	2
SM201178175	IC QUAD D FLIP/FLOP 74HCT175	1
SM206885245	IC BUS TRANSCVR ABT245	1
SM207170036	IC HEX BUFFER 3-ST. PC74HCT365	3
SM208470358	IC DUAL OP AMP 358D	1
SM208780109	IC MICROPOWER DC-DC CONV.	1
SM232032814	DIODE 2814	4
SM275330858	TRANSISTOR PNP BC858C	1
SM280171005	TRANS POWER MOSFET MTD10N05E	1
SM300056332	INDUCTOR WOUND 33 UH	1
SM652101102	RES CHIP (E24) 1% 1 K	3
SM652101103	RES CHIP (E24) 1% 10 K	18
SM652101104	RES CHIP (E24) 1% 100 K	2
SM652101220	RES CHIP (E24) 1% 22 OHMS	1
SM652101334	RES CHIP (E24) 1% 330 K	3
SM654101000	CHIP JUMPER ZERO OHMS	1
SM661207103	CAP CERA CHIP 20% .01UF (0805)	10
SM661207104	CAP CERA CHIP 20% .1 UF	6
SM661255101	CAP CERA CHIP 5% 100 PF	1
SM666327225	CAP MOLD TANT CHIP 2.2 UF	1
SM666377226	CAP MOLD TANT CHIP 22 UF	3


RAMP_G
HSYNC
POWER_AMP
QUIESCENT_CUR
+XYOKE
-XYOKE
SIZE
OFFSET
LINEAR.
SLOPE
LeCroy CORPORATION
MODEL : 93xx
DEFLECTION_PCB
DWG NO: MDA_DEFL
DRAWN
DANIEL_A
CHKD
DANIEL_A
DATE
18-JAN-03
SH 1 OF 3
ECO # 1004


LM1391
ANODE 12.5KV
G2
G4
+90V
G1
VSYNC
+15V
LeCroy CORPORATION
MODEL : 93xx
DELFECTION_PCB


PANEL : INT_CTR
CRT CONTROL FOR ECM-90088
GND
G1
G2
G4
60V
15V
VIDEO
GND
CATHODE
F1
F2
THRESHOLD ADJUST
GAIN-ADJUST
LeCroy CORPORATION
MODEL : 93xx
VIDEO

PART : F93XX-DEFLECTION

Location	Description	Location	Description
C1	10uF	D202	30DF6
C2	680pF	D203	SM-1XH12
C3	22nF	D204	BB4T
C4	.1uF	D205	BB4T
C5	.1uF	D206	BB4T
C6	82nF	D207	BB4T
C7	.1uF	L201	5nH
C8	.1uF	V-DY	V-DY
C9	470uF	L202	V-SIZE
C10	.1uF	L203	V-LIN
C11	.1uF	L204	5nH
C12	470uF	Q1	A733P
C13	4.7nF250V	Q2	A733P
C14	1uF-63V	Q3	C945
C101	1000pF	Q4	A733P
C102	4700pF	Q5	J177
C103	1000pF	Q6	A733P
C104	1000pF	Q7	C945
C105	1uF-50V	Q8	A733P
C106	.1uF	Q9	C945
C107	.1uF	Q10	IRF630
C108	47uF-35V	Q11	C945
C109	.1uF	Q101	H245
C201	8.2nF-630V	Q201	IRF740
C202	1000pF-500V	R1	20K
C203	2.2uF-50V	R2	10K
C205	1000uF-35V	R4	6.65K-1%
C206	.01uF-1KV	R5	10K
C207	47uF-100V	R6	7.5K
C208	10uF-100V	R7	20K
C210	220uF-50V	R8	2.2M
C211	47uF-100V	R9	510K
C212	100uF-25V	R10	10M
C213	47uF-25V	R11	2.26K-1%
C214	.1uF	R12	13.3K-1%
D1	1N4448	R13	510K
D2	1N4448	R14	1M
D3	1N746A	R15	1K
D4	1N746A	R16	220
D5	BYV36C	R17	470
D6	1N758D	R18	1.5K
D7	1N758D	R19	10K
D8	1N5245B	R20	6.8K
D201	30DF4	R21	220K

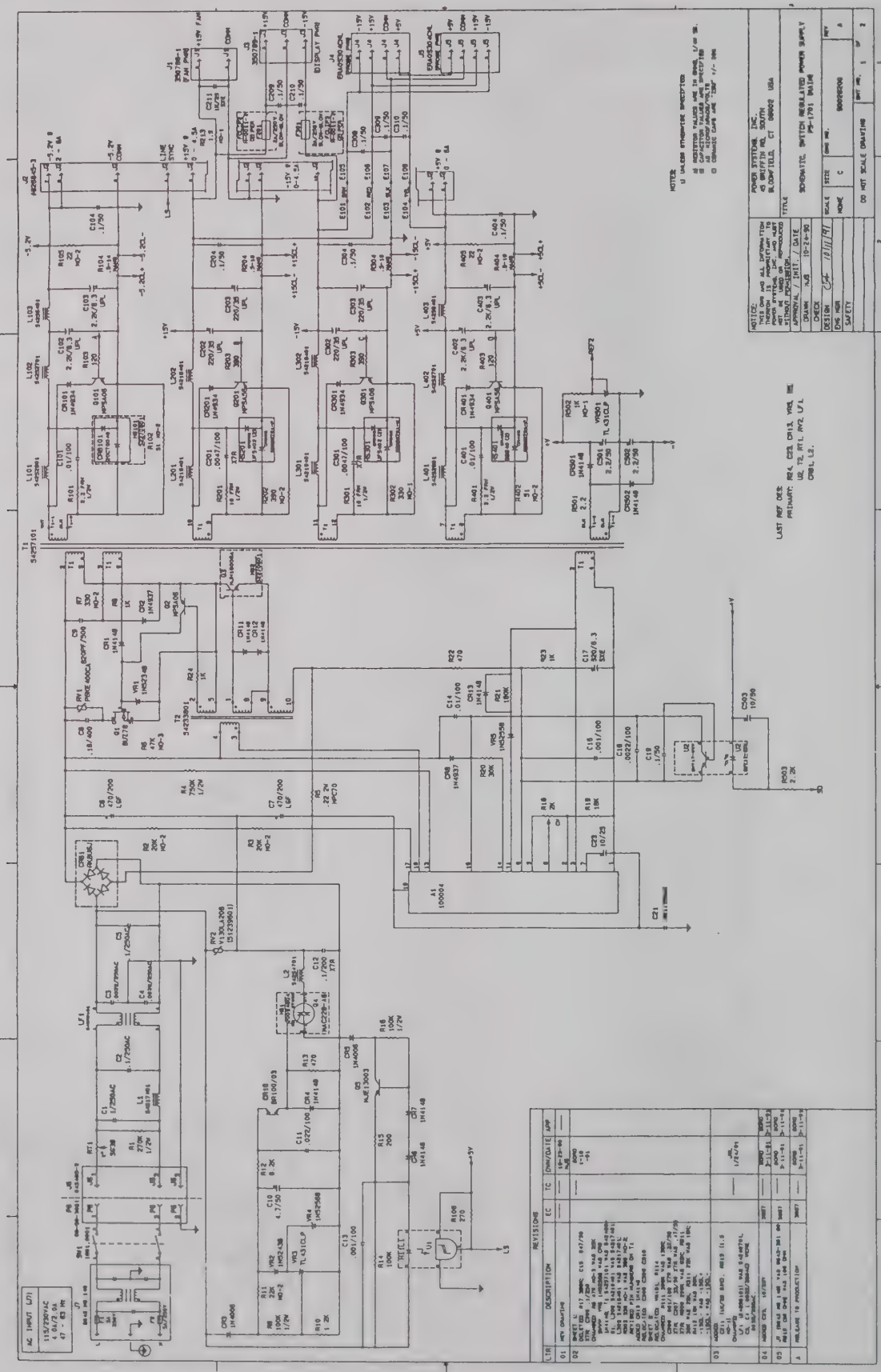
PART : F93XX-DEFLECTION

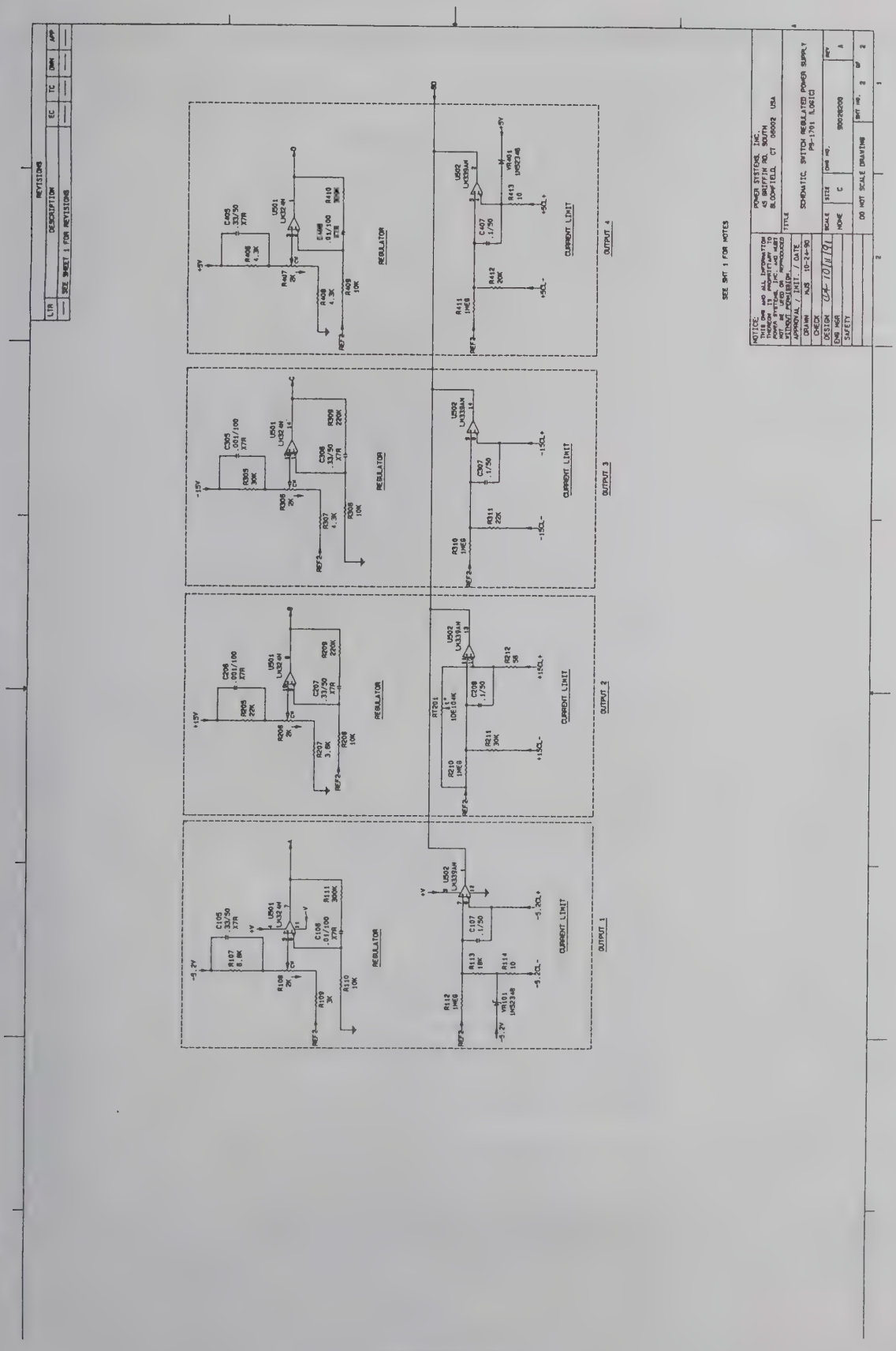
Location	Description
R22	5K
R23	5K
R24	300
R25	30K
R26	510
R27	300
R28	7.5K
R29	2.7
R30	300
R31	300
R32	5K
R33	510
R34	300
R35	7.5K
R36	2.7
R37	910
R38	6.2-1/2W
R40	1.5K
R41	1.5K
R42	7.5K
R101	1K
R102	1K
R103	1K-1/2W
R104	150
R105	1K
R106	39K
R107	18K
R108	56K
R109	22K
R110	12K
R111	18K
R112	22K
R201	10
R202	10K
R203	100-2W
R204	1.2M-1/2W
R205	10K-1/2W
R206	100K
R207	220K
R208	56K
R209	10K
T201	HT
U1	LM3080
U2	LF353
U3	LF353

Location	Description
VR101	10K
VR202	250K
VR203	200-2W
VR206	2M
ZD201	12V

PART : F93XX-VIDEO

Location	Description
C1	100uF-16V
C2	220pF
C3	150pF
C4	100nF
C5	100uF-16V
C6	10uF-16V
C7	100nF
C8	220uF-25V
C9	100nF
C10	100uF-100V
C11	100nF-100V
C12	100nF-100V
D1	5.0V
D2	MV5075C
L1	3.3uH
Q1	2SC1906
Q2	2SC1906
Q3	2SC1906
Q4	2SC1906
Q5	2SC3953
R1	75
R2	10K
R3	50
R4	10
R5	10
R6	10
R8	680
R9	4.7K
R10	330-1/2W
R11	5K
R12	100
R13	820-1/2W
R14	100
R15	47-1/2W
R16	10





PART: ACCESSORIES-9360 DESC: ACCESSORIES FOR 9360 & 9361

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
407099008	PLUG FOR AC LINE - ENGLAND	1
433162500	FUSE SLO-BLO 250V 5 AMP	2
589202200	AC CORD/PLUG FOR GERMANY	1
589203100	AC CORD/"SEV-ASE" PLUG	1
589203218	AC CORD/US-CANADA PLUG	1
597930001	CARTON FOR 93XX	1
597930002	ETHA FOAM FOR 93XX	2
597940014	PLASTIC BAG FOR 94XX & 93XX	2
597940015	MANUAL/ACCESSORY CTN 9400	2
7093XX061	FRONT COVER 93XX	1
931X-RCM-E	936X SERIES REMOTE CONTROL MAN	1
936X-OM-E	9360/61 OPERATOR'S MANUAL ENG.	1
PP002	PASSIVE PROBE 10 MOHM 10:1	2

PART: 93XX-GP01 DESC: GRAPHIC PRINTER

340000402	THERMAL PAPER FOR SEIKO PRINT	1
334000832	THERMAL PRINTER UNIT	1
530040005	SLIDE LATCH TAB STYLE	2
550430106	SCREW CYL HD PHIL M3X6	4
551430100	FLAT WASHER M3	3
551430400	WASHER SHAKEPROOF M3	4
552430300	NUT OPEN-END ACORN M3	3
554430002	SCREW S/TAP PHIL M3X5	6
594120003	TIE WRAP	2
709450523	PUSH SWITCH EXTENDER	1
70GP01031	GRAPHIC PRINTER FRAME	1
70GP01041	GRAPHIC PRINTER COVER AXLE	1
70GP01051	GRAPHIC PRINTER CUTTER	1
70GP01061	GRAPHIC PRINTER SWITCH BUTTON	1
780210030	DISPLAY POWER CABLE	1
780721022	FLAT CABLE 2X10 (22CM)	1
780791604	FLAT CABLE 2X13 (4CM)	1
780801015	FLAT CABLE 2X20 (3 CONNECT.)	1
BOX-GP01	GP01 GRAPHIC PRINTER BOX	1
COVER-GP01	GP01 GRAPHIC PRINTER COVER	1
F9300-6	CENTRONICS/FLOPPY/PRINTER INT	1
F9300-7	LTP 5446 PRINTER CONTROLLER	1
UC93X1-GP01	UPPER COVER FOR GP01 OPTION	1

PART: 93XX-FDGP DESC: GRAPHIC PRINTER & FLOPPY DISK

334000402	THERMAL PAPER FOR SEIKO PRINT	1
334000832	THERMAL PRINTER UNIT	1
335023203	FLOPPY DISK DRIVE 31/2"	1

PART: 93XX-FDGP **DESC: GRAPHIC PRINTER & FLOPPY DISK**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
530040005	SLIDE LATCH TAB STYLE	2
550425104	SCREW CYL HD PHIL M2,5X4	4
550430106	SCREW CYL HD PHIL M3X6	6
551430100	FLAT WASHER M3	3
551430400	WASHER SHAKEPROOF M3	4
552430300	NUT OPEN-END ACORN M3	3
554030101	NUT BANC-LOK TYPE MV M3	2
554430002	SCREW S/TAP PHIL M3X5	10
594120003	TIE WRAP	2
709450523	PUSH SWITCH EXTENDER	1
70FD01021	FLOPPY DISK DRIVE SUPPORT	1
70FD01031	FLOPPY DISK DRIVE FRAME	1
70GP01031	GRAPHIC PRINTER FRAME	1
70GP01041	GRAPHIC PRINTER COVER AXLE	1
70GP01051	GRAPHIC PRINTER CUTTER	1
70GP01061	GRAPHIC PRINTER SWITCH BUTTON	1
780210030	DISPLAY POWER CABLE	1
780721022	FLAT CABLE 2X10 (22CM)	1
780791604	FLAT CABLE 2X13 (4CM)	1
780791630	FLAT CABLE 2X13 (30CM)	1
780801015	FLAT CABLE 2X20 (3 CONNECT.)	1
BOX-GP01	GP01 GRAPHIC PRINTER BOX	1
COVER-GP01	GP01 GRAPHIC PRINTER COVER	1
CUP-FD01	FD01 FLOPPY DISK DRIVE CUP	1
F9300-6	CENTRONICS/FLOPPY/PRINTER INT	1
F9300-7	LTP 5446 PRINTER CONTROLLER	1
UC93X1-FDGP	UPPER COVER FOR FD/GP OPTIONS	1

PART: 93XX-FD01 **DESC: FLOPPY DISK**

335023203	FLOPPY DISK DRIVE 31/2"	1
550425104	SCREW CYL HD PHIL M2,5X4	4
550430106	SCREW CYL HD PHIL M3X6	4
551430400	WASHER SHAKEPROOF M3	2
551430400	WASHER SHAKEPROOF M3	2
554030101	NUT BANC-LOCK TYPE MV M3	2
554430002	SCREW S/TAP PHIL M3X5	4
70FD01021	FLOPPY DISK DRIVE SUPPORT	1
70FD01031	FLOPPY DISK DRIVE FRAME	1
780791630	FLAT CABLE 2X13 (30CM)	1
780801015	FLAT CABLE 2X20 (3 CONNECT.)	1
CUP-FD01	FD01 FLOPPY DISK DRIVE CUP	1
F9300-6	CENTRONICS/FLOPPY/PRINTER INT. B	1
UC93X1-FD01	UPPER COVER FOR FD01 OPTION	1

PART: M936X	DESC: MECHANICAL FOR 9360 & 9361	
377051005	LABEL "DANGER-------ONLY"	1
377131001	LABEL (GROUND SYMBOL)	1
407036002	FUSE HOLDER 2 POLE BLK 6.3X32	1
433162500	FUSE 250V/5A	2
434690002	LINE INPUT MODULE 250V/6A	1
485023462	FOOT BUMPON GREY	4
485123001	BUMPER (FOOT) SQUARE GREY RUB	2
530301009	BLK HANDLE W/2 BLACK END CAPS	1
550430106	SCREW CYL HD PHIL M3X6	11
550430116	SCREW CYL HD PHIL M3X16	5
550430120	SCREW CYL HD PHIL M3X20	8
550430508	SCREW FLAT HD PHIL M3X8	2
550430706	SCREW ECO-FIX M3X6	6
550440605	SCREW OVAL HD PHIL M4X5	8
550440608	SCREW OVAL PHIL M4X8	7
551430400	WASHER SHAKEPROOF M3	6
551450400	WASHER SHAKEPROOF M5	2
554030101	NUT BANC-LOK TYPE MV M3	7
554035101	CLIP-ON NUT DIAM. 3.5	4
554425003	SCREW S/TAP PHIL M2.5X6 BLACK	6
554435003	SCREW PT PHIL KA35X20	4
554435004	SCREW PT PHIL KA35X10	4
554435005	SCREW CYL HD PHIL 3.5X9.5	4
554440001	SCREW PT PHIL KA 40 X 12	4
554440202	FLAT WASHER M4	4
560032008	SCREW PHILIPS 10-32X1/2	2
594120003	TIEWRAP	1
709300911	LABEL CE	1
7093XX041	FOOT SUPPORT 93XX	2
7093XX051	FOOT 93XX	2
7093XX091	FRONT FRAME BRACKET 93XX	4
7093XX321	MAIN CARD STANDOFF 12MM	4
7093XX902	FAN 93XX-9 ASSEMBLY	1
7093XX931	INTERF. HOLE CLOSURE 93XX-9	2
709424096	INSERTION GUIDE FOR MC	1
780220033	BASE CARD POWER CABLE	1
780661104	FLAT CABLE 2X7 (4 CM)	1
780671110	FLAT CABLE 2X20 (10 CM)	1
780681611	PS1715 LINE INPUT CABLE	1
780721105	FLAT CABLE 2X10 (5,5CM)	1
780754515	GROUND CABLE YEL/GREEN 15CM	1
93XX-DISPLAY	RASTER MONITOR KIT	1
93XX-PS1715	DSO POWER SUPPLY W/SHIELDING	1
FF93X1	FRONT FRAME DSO 93XX	1
LC93X1	LOWER COVER DSO 93XX	1
RP9314-9	REAR PANEL 9314-9	1
UC93X1	UPPER COVER DSO 93XX	1
US9360-3	UPPER SHIELD ASSEMBLY	1

SECTION 9 MECHANICAL PARTS

9360 & 9361 Digital Oscilloscope

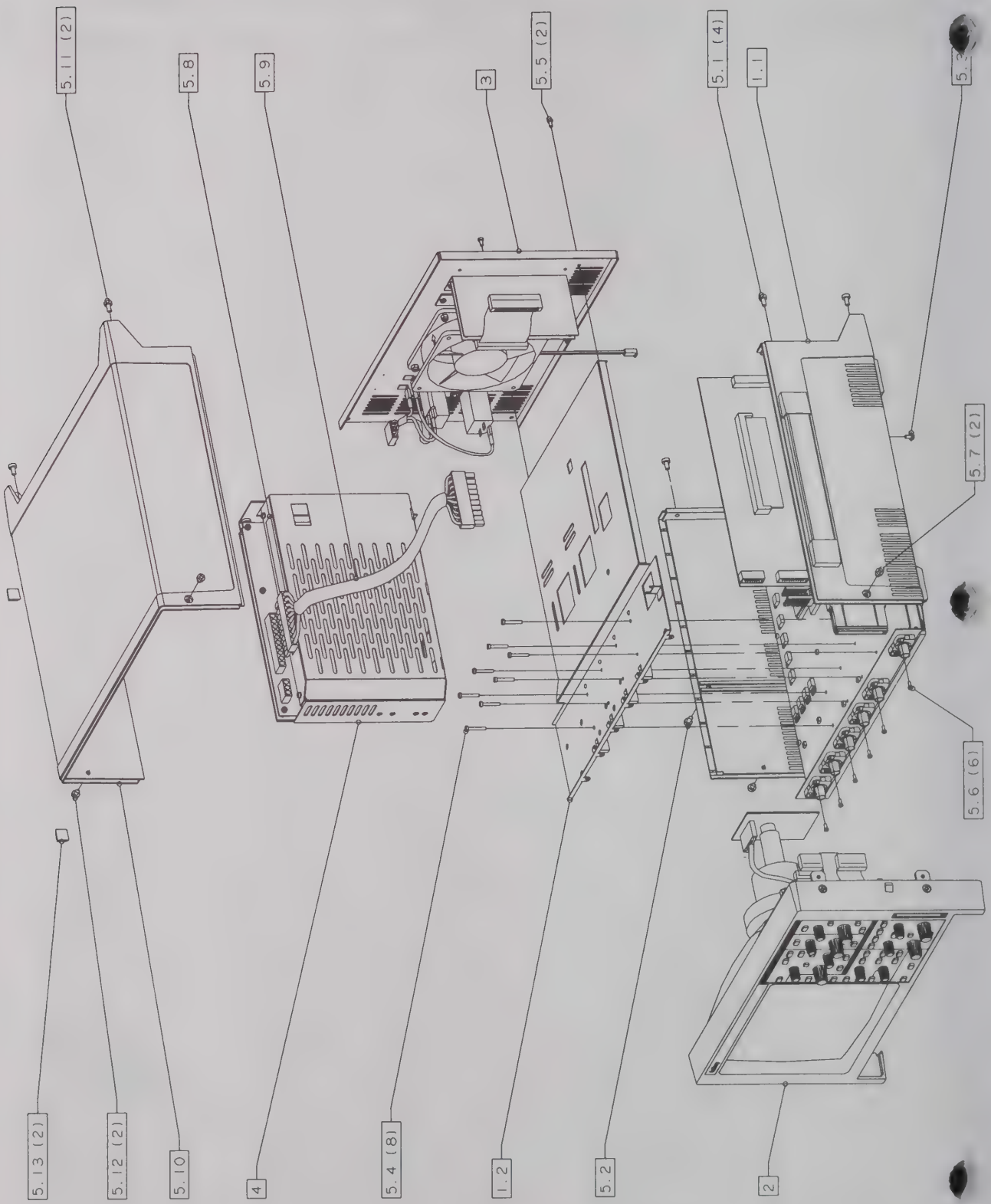


Figure 9.1 : 9360 DSO Exploded View

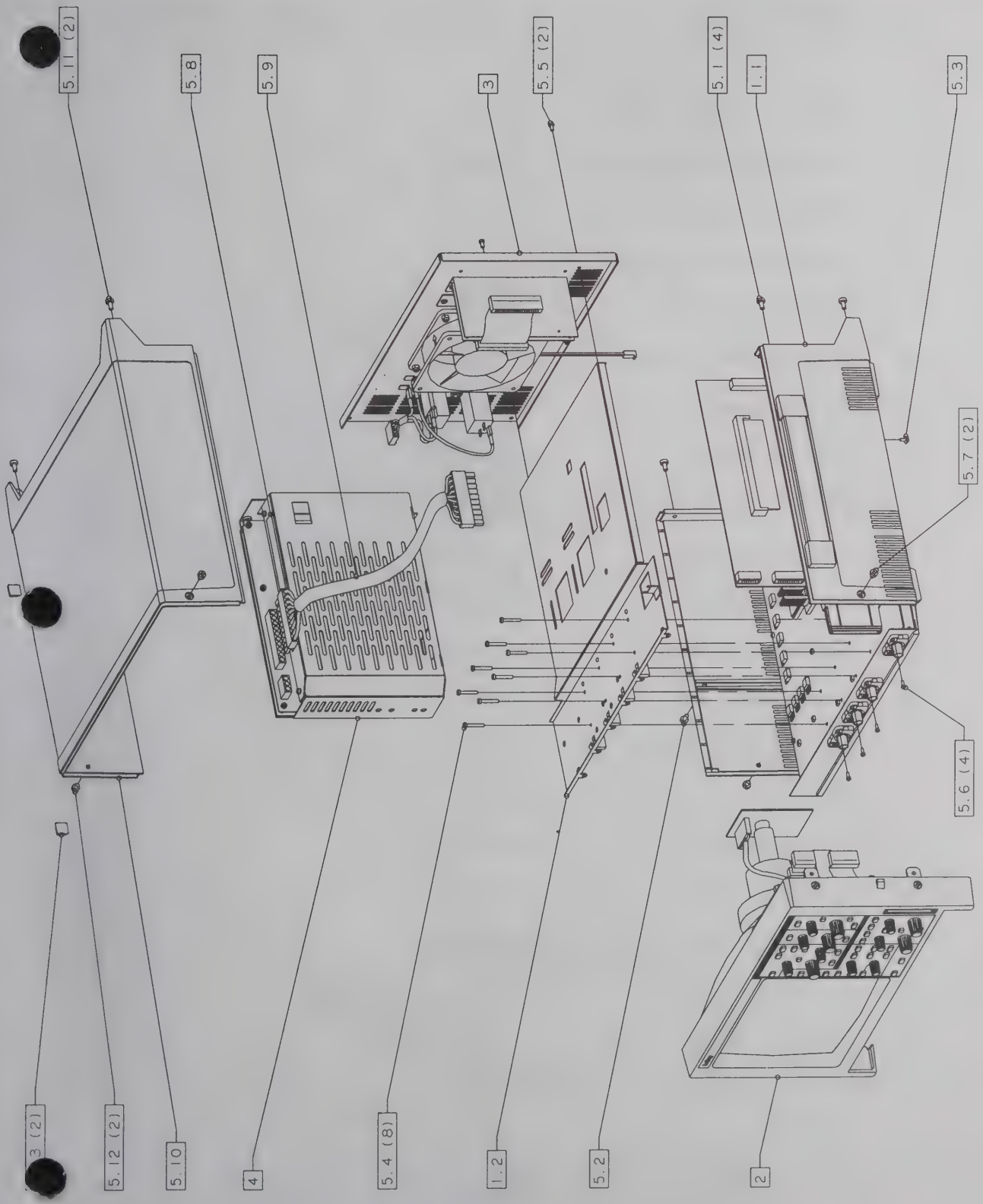


Figure 9.2 : 9361 DSO Exploded View

9.1.2	9360/9361 Assembly	Part Description	Quantity per Assembly
1.1	9360/61 lower cover assembly	LC93X1	1
1.2	9360/61 upper shield assembly	US9360-3	1
2.	9360/61 front frame assembly		1
3.	9360/61 Rear panel assembly		1
4.	PS 1715 power supply	93XX-PS1715	1
5.1	Screw oval head M4x8	550 440 608	4
5.2	Screw oval head M4x8	550 440 608	1
5.3	Screw eco-fix M3x6	550 430 706	1
5.4	Screw cyl head M3x20	550 430 120	8
5.5	Screw eco-fix M3x6	550 430 706	2
5.6	Screw taptite M2,5x6	554 425 003	6
5.7	Screw oval head M4x5	550 440 605	2
5.8	Label "Danger ... only"	377 051 005	1
5.9	Main card power cable	780 220 033	1
5.10	Upper cover	UC 93X1	1
5.11	Screw oval head M4x8	550 440 608	2
5.12	Screw oval head M4x5	550 440 605	2
5.13	Self adhesive foot	485 023 462	2

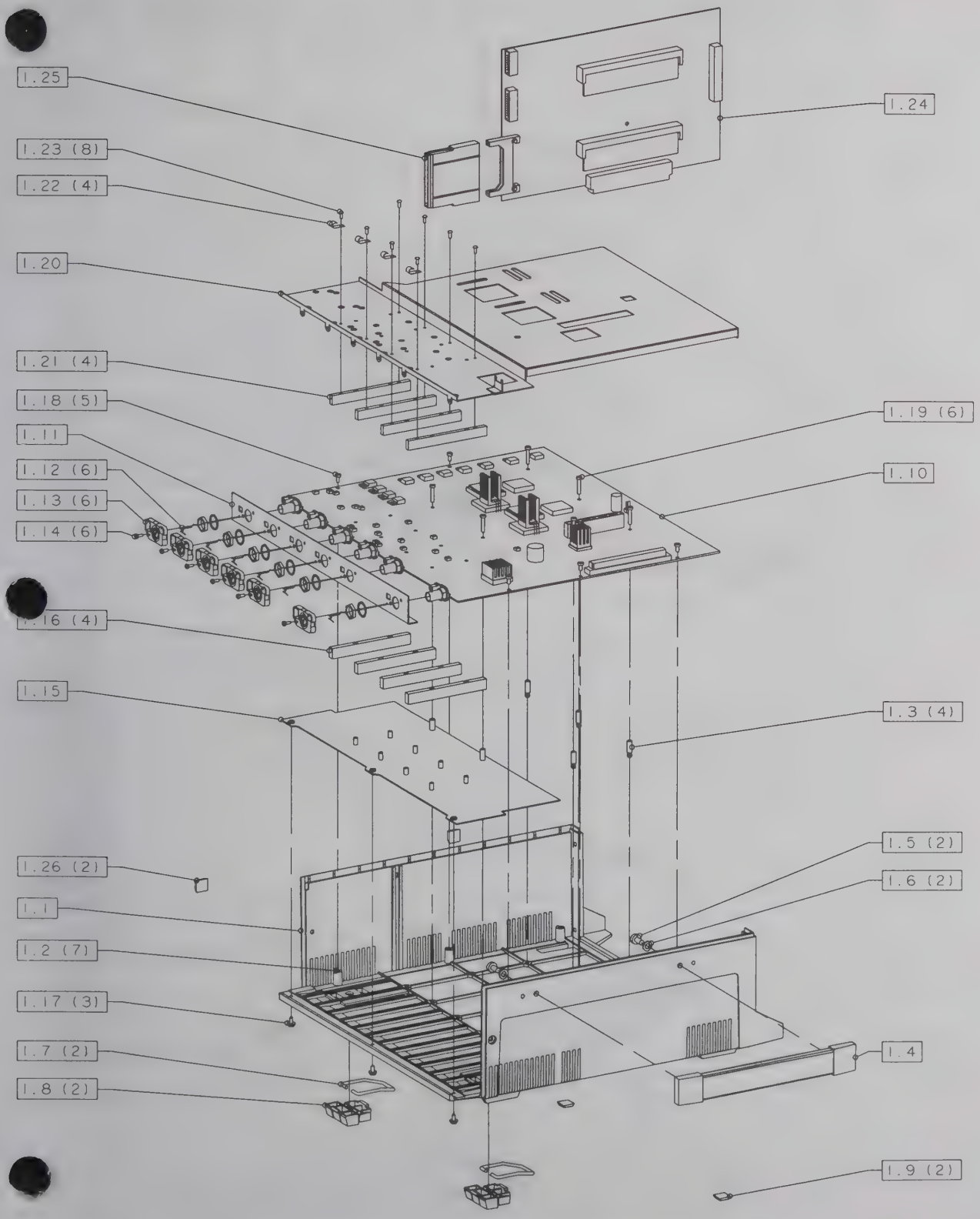


Figure 9.3 : 9360 Lower Cover Exploded View

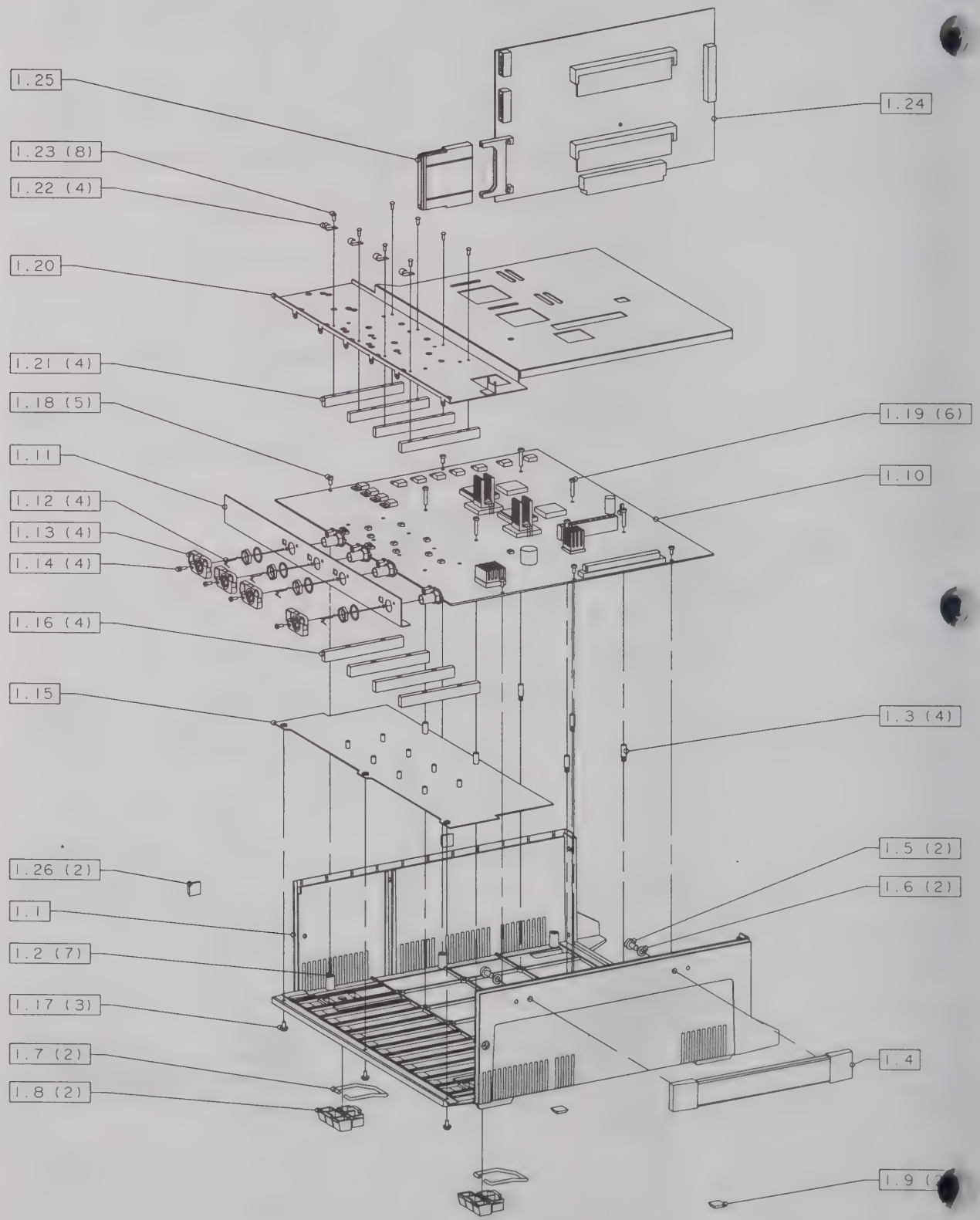


Figure 9.4 : 9361 Lower Cover Exploded View

9.2.2	9360/61 Lower Cover Assembly	Part Description	Quantity per Assembly
1.1	Lower cover	LC 93X1	1
1.2	Nut Banc-Lock M3	554 030 101	7
1.3	Main card standoff M3	709 3XX 321	4
1.4	Handle with caps	530 301 009	1
1.5	Screw cyl head 10-32 x 1/2	560 032 008	2
1.6	Lockwasher M5	551 450 400	2
1.7	Foot	709 3XX 051	2
1.8	Foot support	709 3XX 041	2
1.9	Self adhesive foot	485 123 001	2
1.10	Main board 9360 or 9361	F9360-3 or F9361-3	1
1.11	Main board panel 9360/61	FP9360-3 or FP9361-3	1
1.12	Probe ring contact	709 3XX P91	6 or 4
1.13	Probe holder	709 3XX P41	6 or 4
1.14	Screw taptite M2,5x6	554 425 003	6 or 4
1.15	9360/61 base shield	709 360 331	1
1.16	Lower partition shield	709 3XX 361	4
1.17	Screw eco-fix M3x6	550 430 706	3
1.18	Screw cyl head M3x6	550 430 106	5
1.19	Screw cyl head M3x16	550 430 116	6
1.20	9360/61 upper shield	709 360 321	1
1.21	Upper partition shield	709 3XX 351	4
1.22	Shield contact	709 3XX 371	4
1.23	Nail rivet M2,5x6	554 425 004	8
1.24	Processor card	F9302-1-4 or F9300-1-2	1
1.25	Memory card insertion guide	709 424 096	1
1.26	Self adhesive foot	485 023 462	2

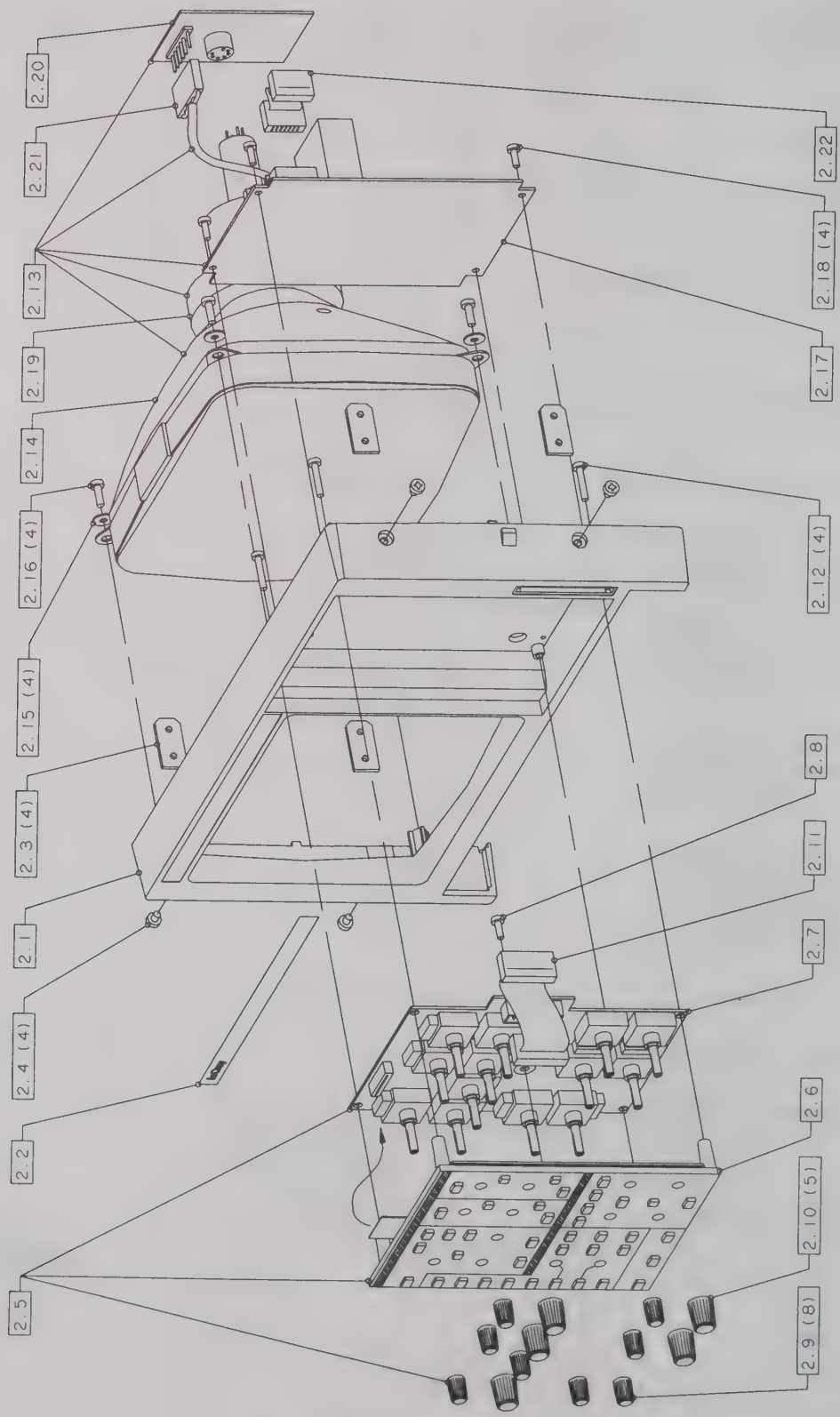


Figure 9.5 : 9360/9361 Front Frame Exploded View

9.3.1	936X Front Panel Assembly	Part Description	Quantity per Assembly
2.1	Front frame	FF 93X1	1
2.2	Front label 9360	709 360 016	1
	Front label 9361	709 361 016	1
2.3	Front frame bracket	709 3XX 091	4
2.4	Screw oval head M4x5	550 440 605	4
2.5	Front panel assembly	F9350-5	1
2.6	Front panel keyboard ass'y	729 350 513	1
2.7	Front panel pcb ass'y	9350-5	1
2.8	Screw PT KA 35x10	554 435 004	1
2.9	Knob diameter 10mm	709 3XX 511	8
2.10	Knob diameter 14mm	709 3XX 521	5
2.11	20 lines flat cable	780 721 105	1
2.12	Screw PT KA 35x20	554 435 003	4
2.13	Raster monitor kit	93XX-Display	1
2.14	9 inch CRT	93XX-CRT	1
2.15	Flat washer M4	554 440 202	4
2.16	Screw PT KA 40x12	554 440 001	4
2.17	Deflection board	93XX-Deflection	1
2.18	Screw PT KA 35x10	554 435 004	4
2.19	Deflection yoke	93XX-Yoke	1
2.20	Video board	93XX-Video	1
2.21	Monitor cable		1
2.22	14 lines flat cable	780 661 104	1

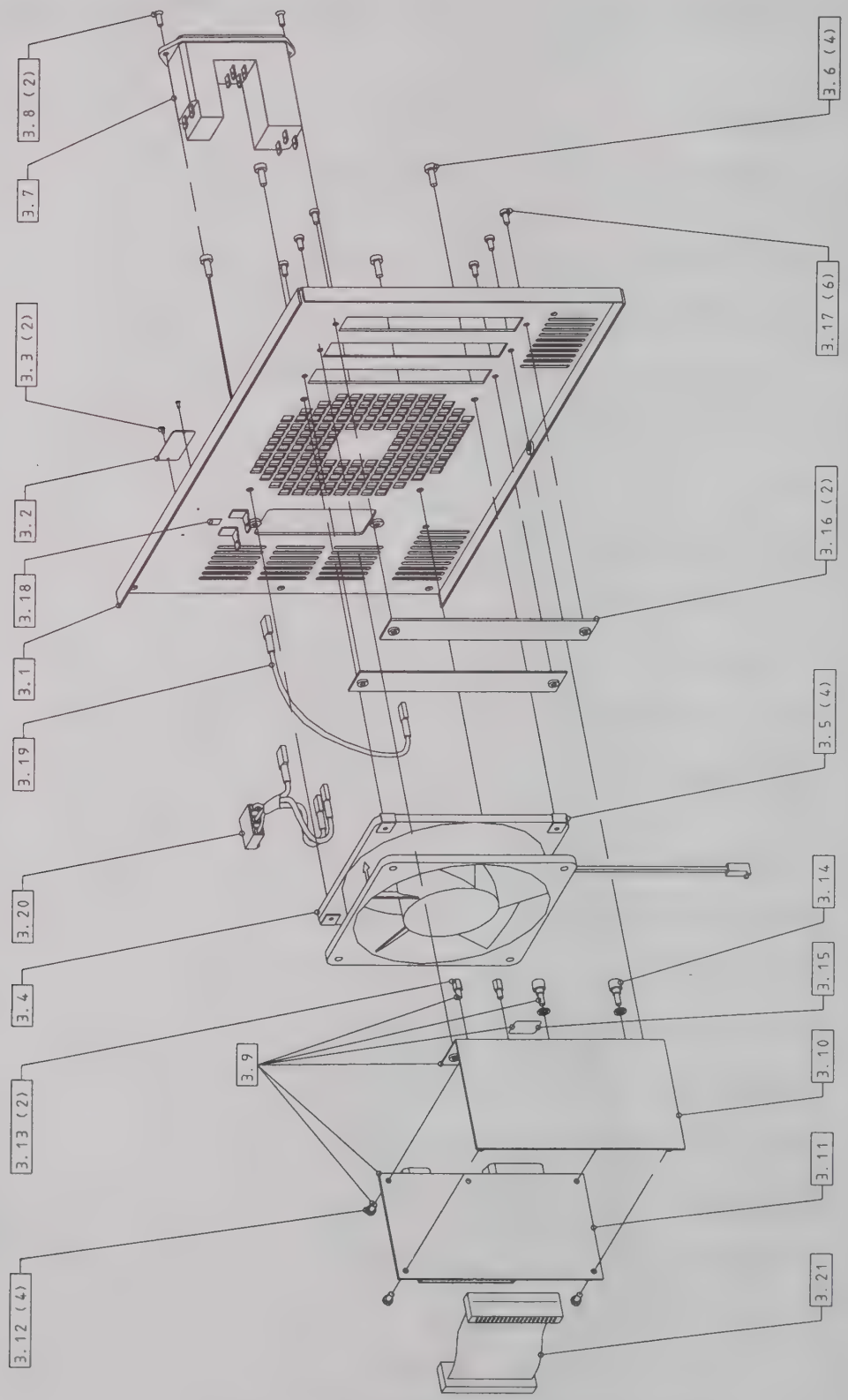


Figure 9.6 : 9360/9361 Rear Panel Exploded View

9.4.1	9360/61 Rear Panel Assembly	Part Description	Quantity per Assembly
3.1	Rear panel	RP 9314-9	1
3.2	9360 Serial number plate	709 360 913	1
	9361 Serial number plate	709 361 913	1
3.3	Taping screw	554 500 001	2
3.4	Fan asssembly	709 3XX 902	1
3.5	Clip on nut 3.5	554 035 101	4
3.6	Screw 3.5 X 9.5	554 435 005	4
3.7	Line input module	434 690 002	1
	Fuse holder	407 036 002	1
	Fuse 5A / 250 V	433 162 500	2
3.8	Screw flat head M3x8	550 430 508	2
3.9	RS232/GPIB interface assembly	F9300-4	1
3.10	Interface card bracket	709 300 411	1
3.11	Interface card	9300-4	1
3.12	Screw cyl head M3x6	550 430 106	4
	Washer Shakeproof M3	551 430 400	4
3.13	Mounting hardware	455 980 002	2
3.14	Connector kit	435 521 024	2
3.15	Label " RS232C "	709 300 421	1
3.16	Interface hole closure	709 3XX 931	2
3.17	Screw cyl head M3x6	550 430 106	6
	Washer shakeproof M3	551 430 400	6
3.18	Ground label	377 131 001	1
3.19	Ground cable	780 754 515	1
3.20	Line input cable	780 681 611	1
3.21	40 lines flat cable	780 671 110	1

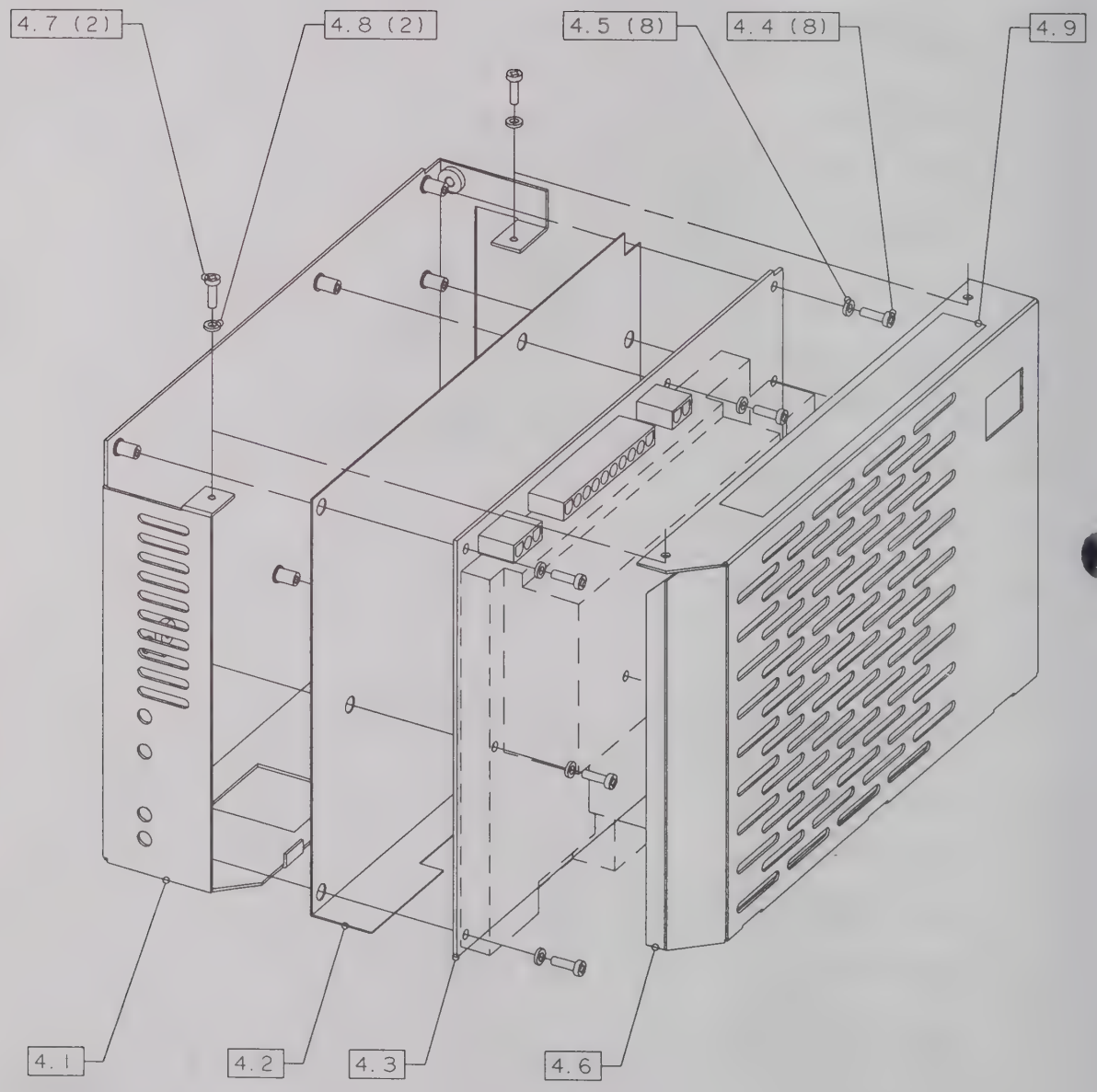


Figure 9.7 : 93XX-PS1715 Power Supply Exploded View

9.5.1	Power supply 93XX-PS1715	Part Description	Quantity per Assembly
4.1	Power supply bracket	709 3XX 071	1
4.2	Power supply insulator	93XX-M11	1
4.3	Power supply board	PS 1715	1
4.4	Screw cyl head M3x6	550 430 106	8
4.5	Lockwasher M3	551 430 400	8
4.6	Power supply cover	709 3XX 081	1
4.7	Screw cyl head M3x6	550 430 106	2
4.8	Lockwasher M3	551 430 400	2
4.9	Label " Danger....only "	377 051 005	1

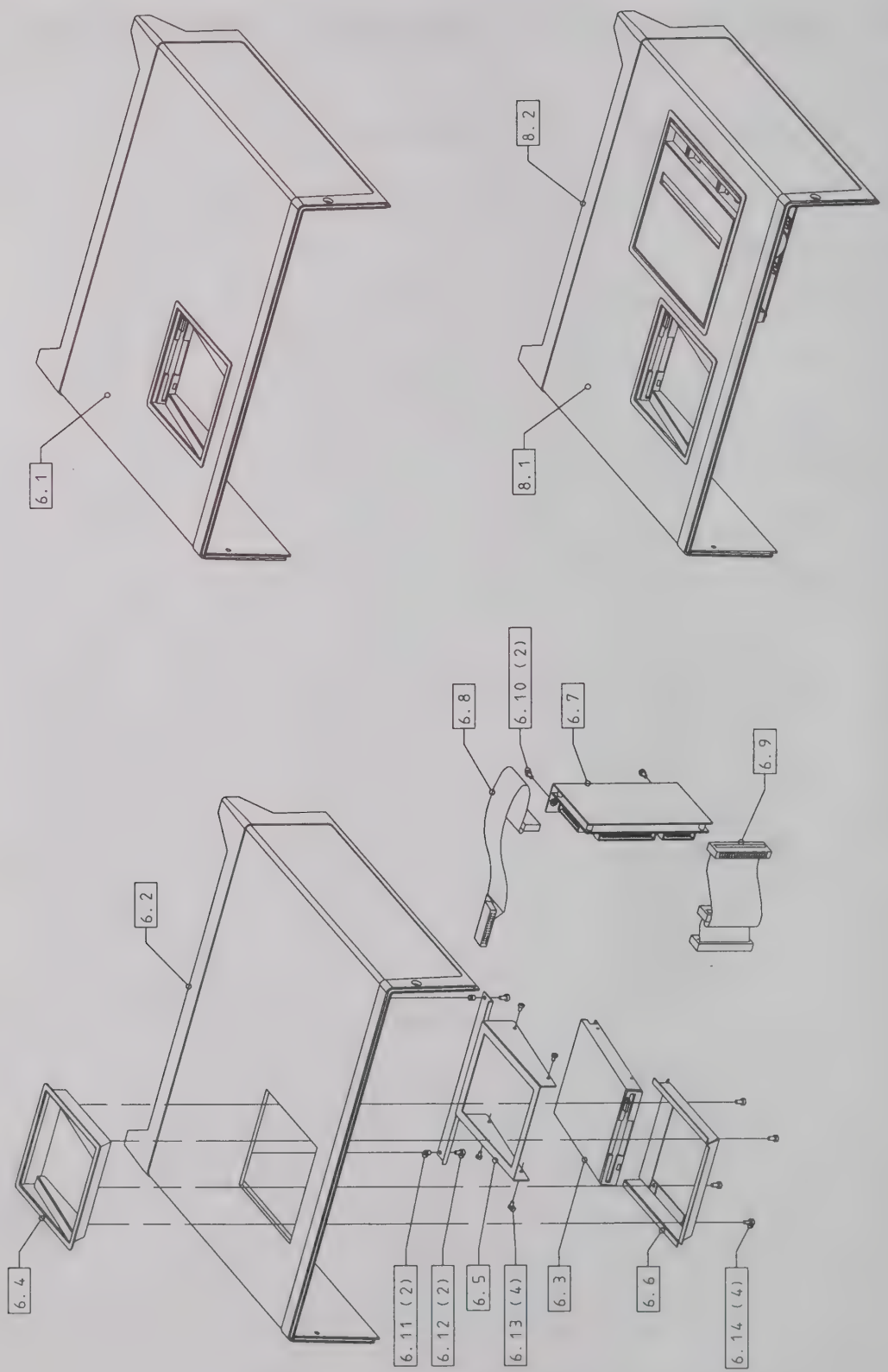


Figure 9.8 : FD01 Floppy Option

9.6.1	FD01 Floppy Option	Part Description	Quantity per Assembly
6.1	Floppy drive option	93XX-FD01	1
6.2	Upper cover	UC93X1-FD01	1
6.3	Floppy drive	335 023 203	1
6.4	Cup	CUP-FD01	1
6.5	Support	70FD01021	1
6.6	Frame	70FD01031	1
6.7	Floppy/Printer/Cent interface	F9300-6	1
6.8	Flat cable 26 P	780 791 630	1
6.9	Flat cable 40 P	780 801 015	1
6.10	Screw M3x6 Washer M3	550 430 106 551 430 400	2 2
6.11	Nut banc lock M3	554 030 101	2
6.12	Screw M3x6	550 430 106	2
6.13	Screw M2.5x4	550 425 014	4
6.14	Screw self taping M3x5	554 430 002	4
8.1	Floppy and Printer options	93XX-FDGP	1
8.2	Floppy&Printer Upper cover	UC93X1-FDGP	1

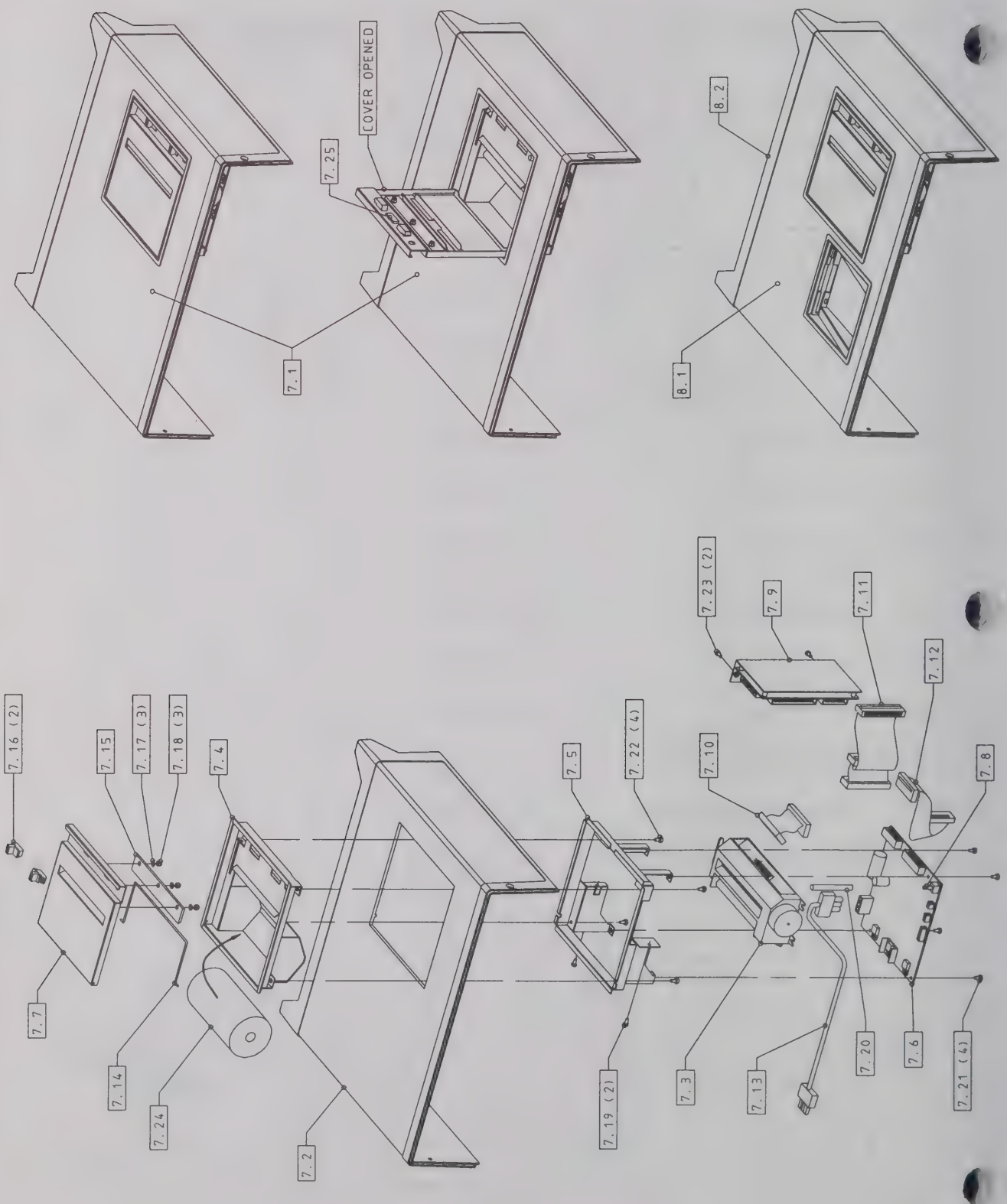


Figure 9.9 : GP01 Printer Option

9.7.1	GP01 Printer Option	Part Description	Quantity per Assembly
7.1	Graphic printer option	93XX-GP01	1
7.2	Upper cover	UC93X1-GP01	1
7.3	Graphic printer	334 000 832	1
7.4	Box	BOX-GP01	1
7.5	Frame	70GP01031	1
7.6	Printer interface card	F9300-7	1
7.7	Cover	COVER-GP01	1
7.8	Switch push button	709 450 523	1
7.9	Floppy/Printer/Cent interface	F9300-6	1
7.10	Flat cable 26 P	780 791 604	1
7.11	Flat cable 40 P	780 801 015	1
7.12	Flat cable 20 P	780 721 022	1
7.13	Power supply cable	780 210 030	1
7.14	Cover Axle	70GP01041	1
7.15	Cutter	70GP01051	1
7.16	Slide latch	530 040 005	2
7.17	Flat washer M3	551 430 100	3
7.18	Nut acorn M3	552 430 300	3
7.19	Screw self taping M3x5	554 430 002	2
7.20	Push switch extender	70GP01061	1
7.21	Screw M3x6	550 430 106	4
	Washer M3	551 430 400	4
7.22	Screw M3x5	554 430 002	4
7.23	Screw M3x6	550 430 106	2
	Washer M3	551 430 400	2
7.24	Thermal paper roll	344 000 042	1
7.25	Auto adhesive rubber band		1
8.1	Floppy and Printer options	93XX-FDGP	1
8.2	Floppy&Printer Upper cover	UC93X1-FDGP	1

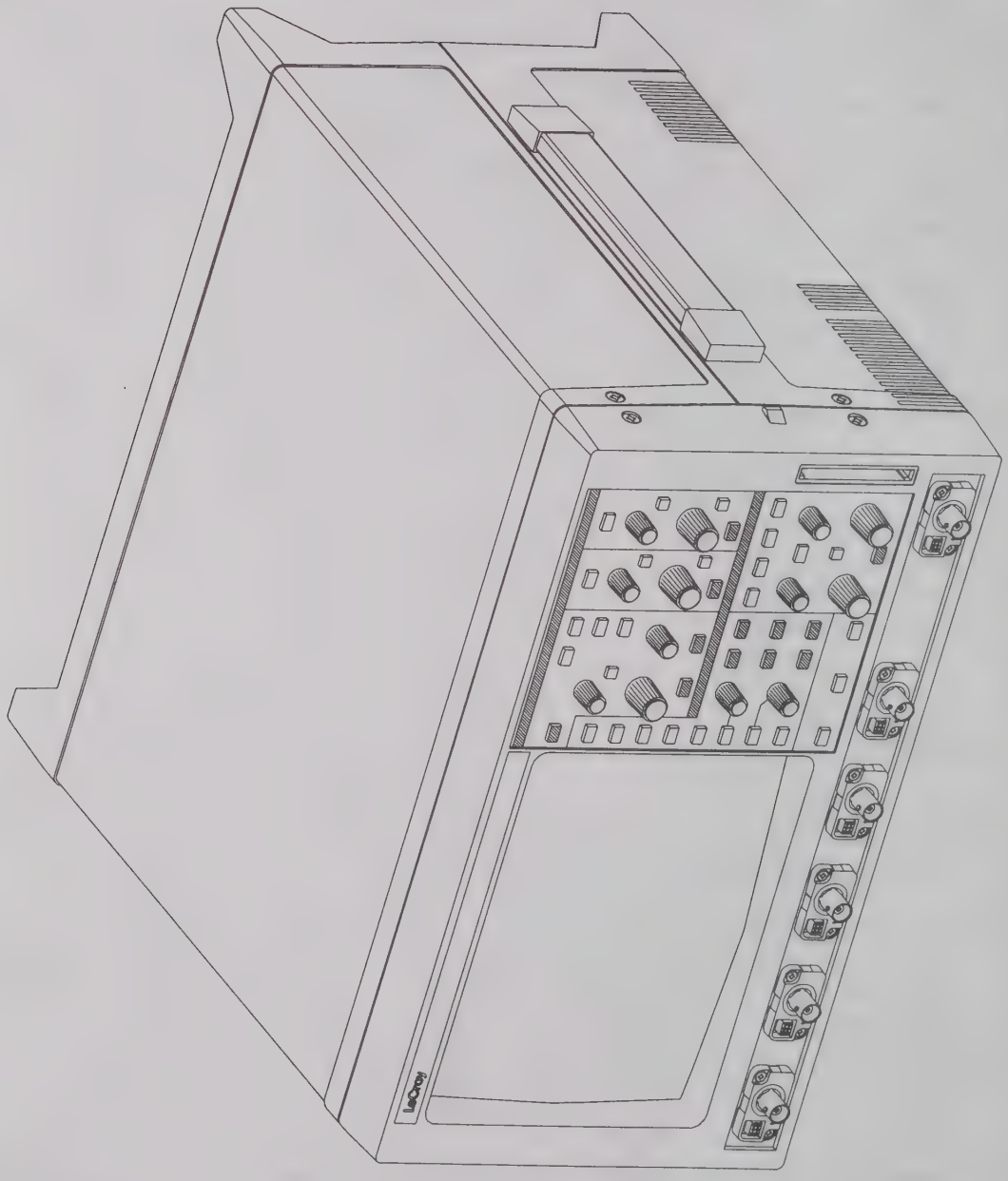


Figure 9.10 : 9360 DSO Front View

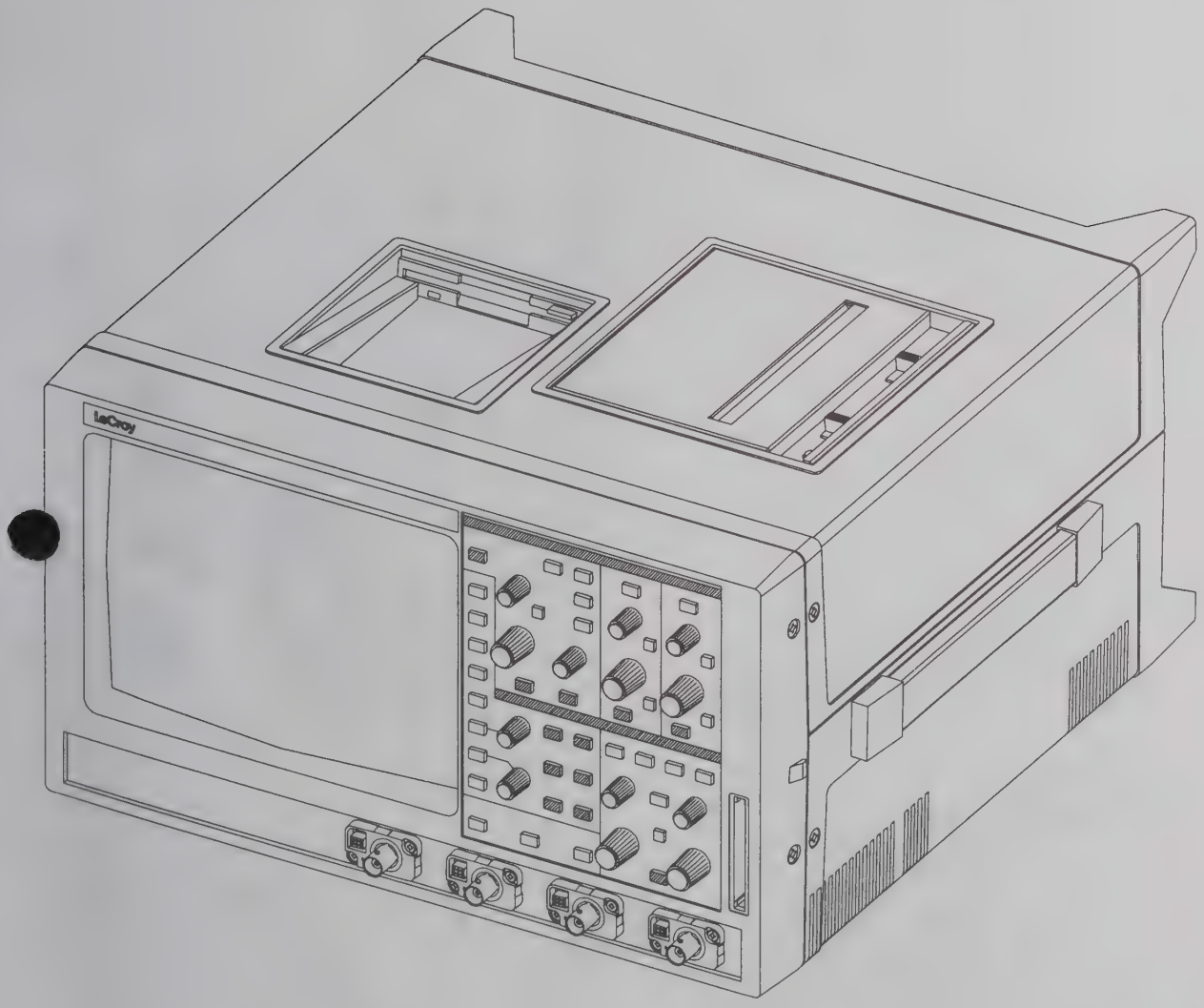


Figure 9.11 : 9361 DSO Front View

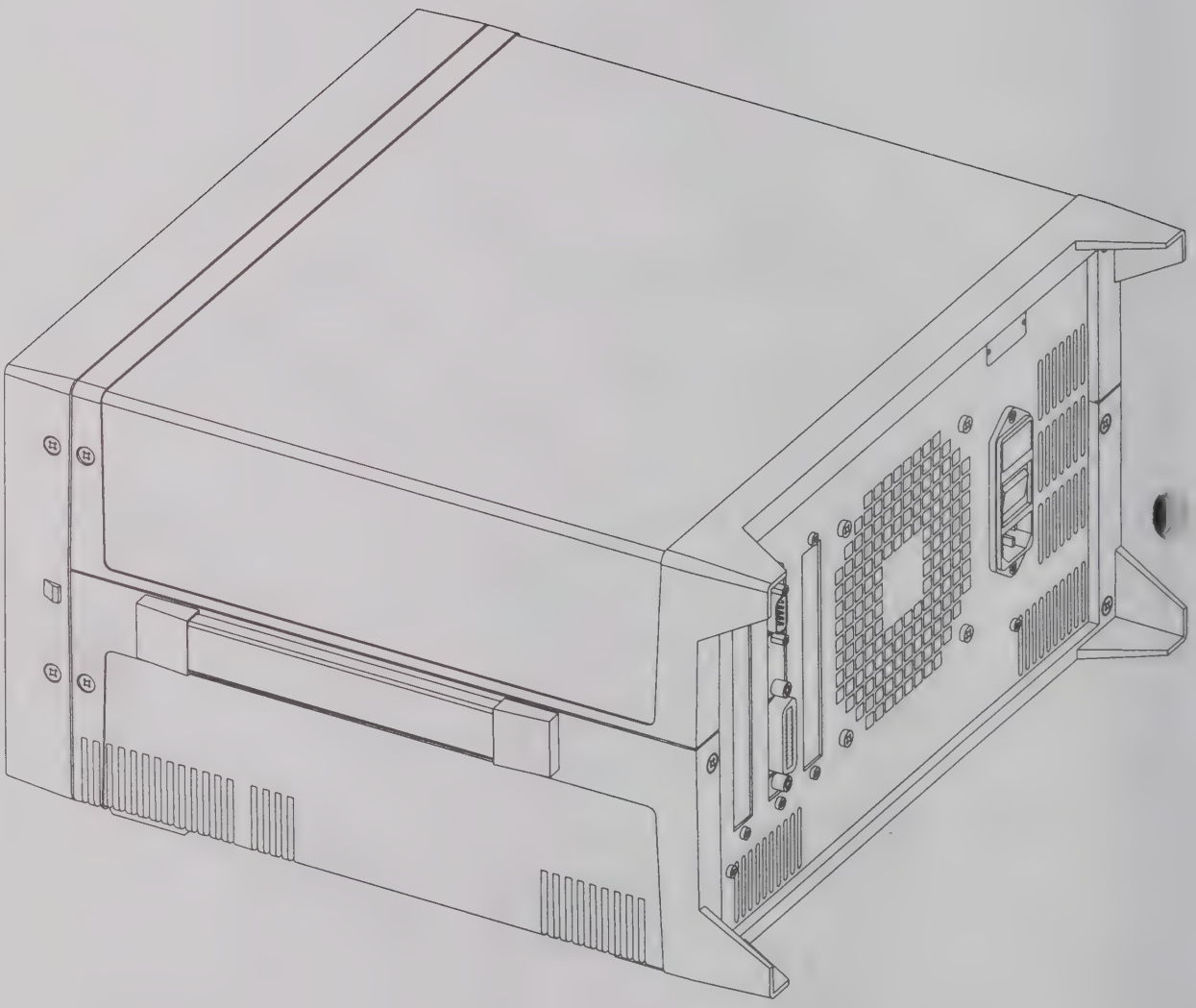


Figure 9.12 : 9360/9361 DSO Rear View

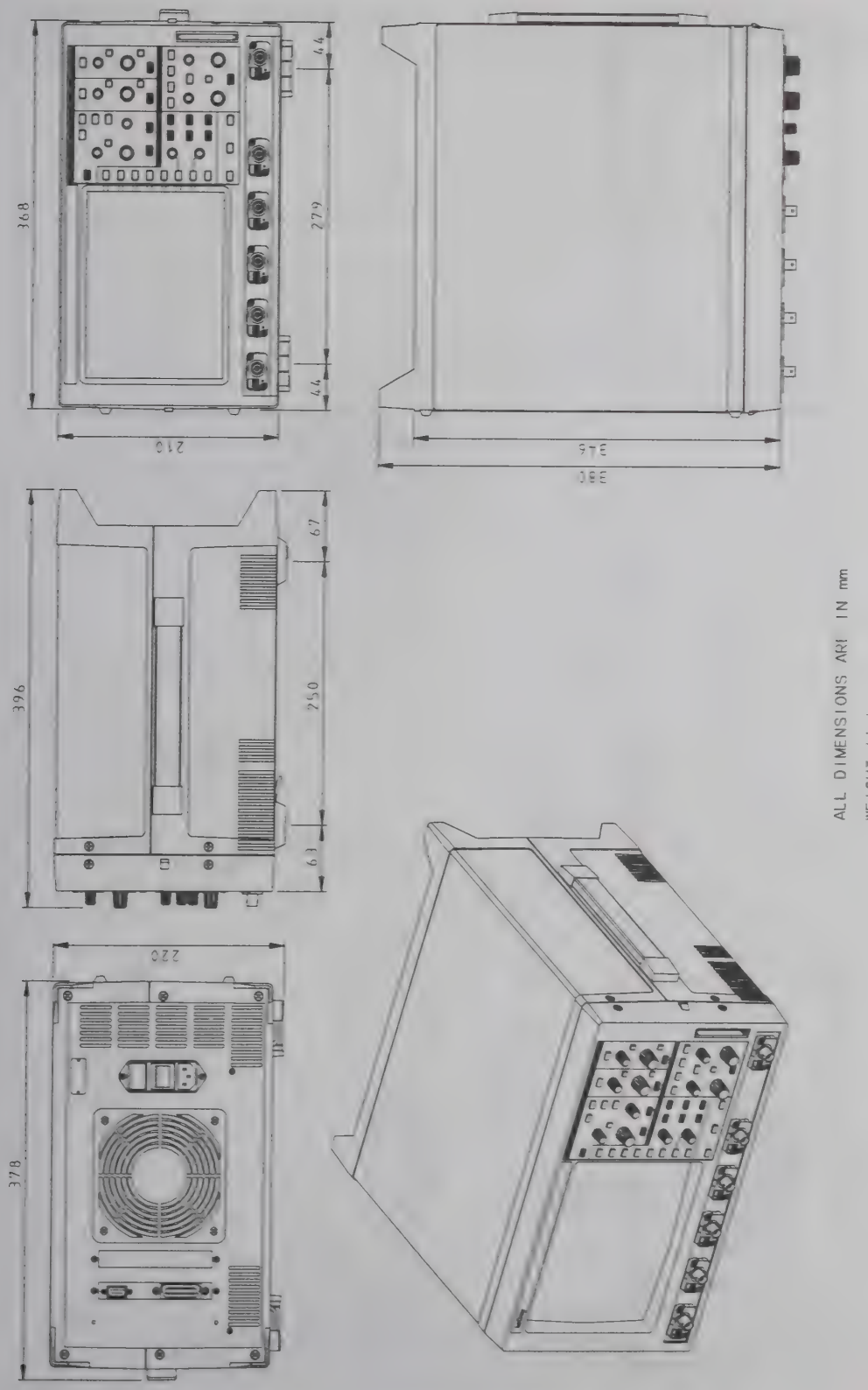


Figure 9.13 : 9360/9361 DSO Dimensions

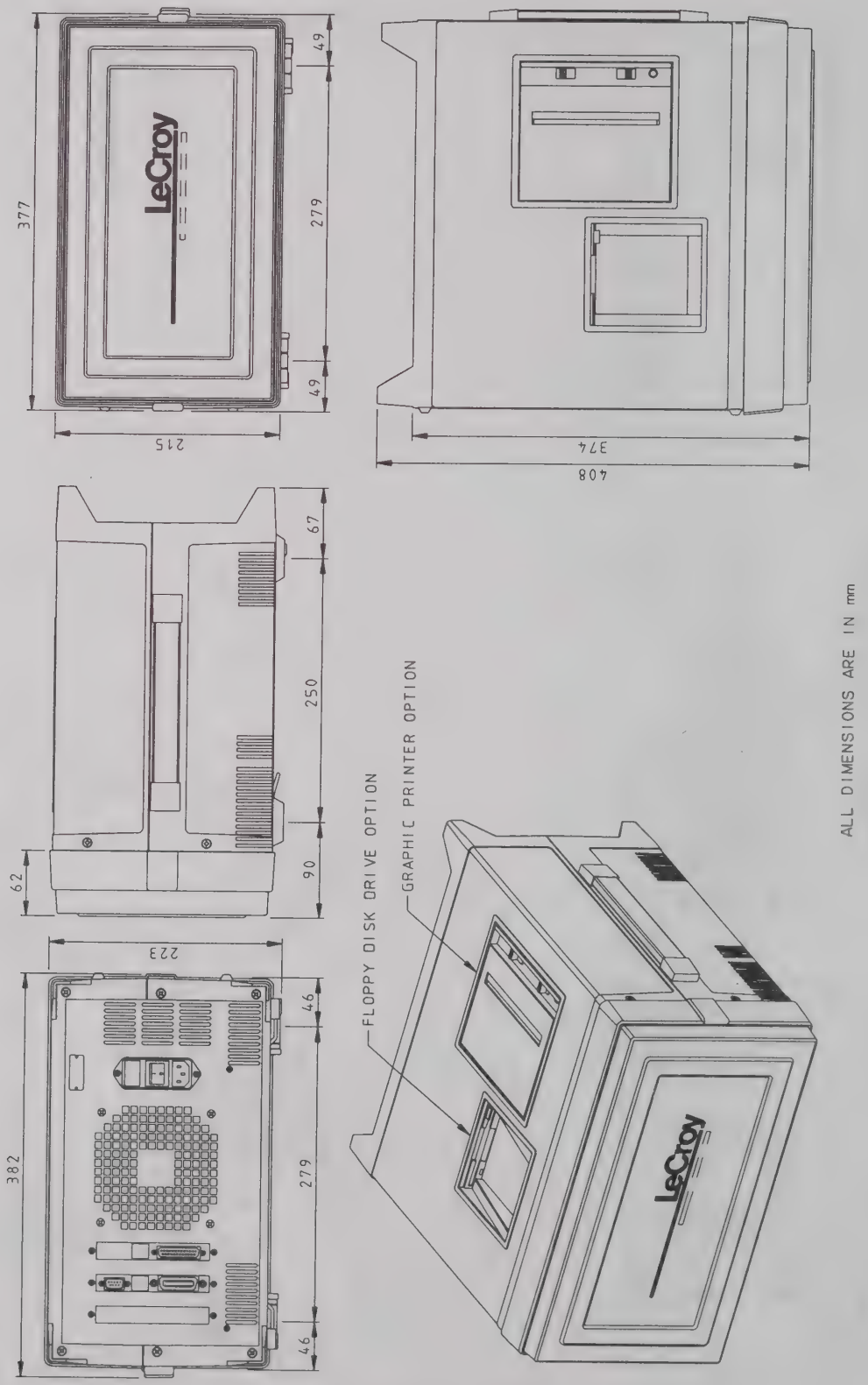


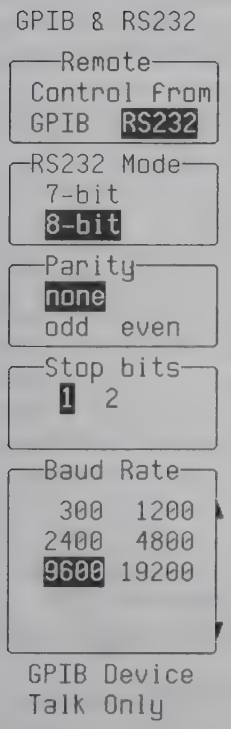
Figure 9.14 : 9360/9361 DSO Dimensions with Protective Cover

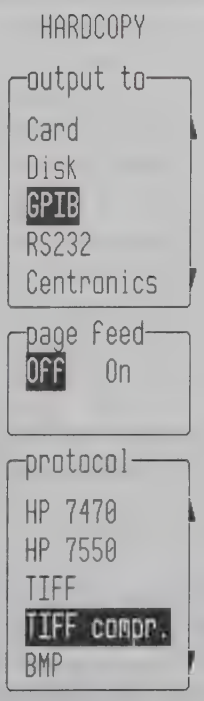
SECTION 10 CONNECTING the 9360/61 to a PLOTTER or a PRINTER

10.1 Introduction

LeCroy oscilloscopes are supplied with a list of plotters and printers known to work with them.
This list is not final, so any suggestions are welcome.

HP plotter responses to some RS-232 configuration commands have been evolved. Consequently, the 9360/61 generation DSO support HP plotters of two types, 7470A and 7550A. The only difference lies in the RS-232 initialization codes. They may however, despite these changes, work with HPGL compatible plotters from other manufacturers. If the HPGL data is used as input for a CAD or word processing system, it might be necessary to remove the data preceding the in command. Before connecting a plotter to a 9360/61, do not forget to select the appropriate settings in the printer setup menu and the GPIB & RS-232 setup menu.





RS-232 connection

The following settings are assumed for the scope.

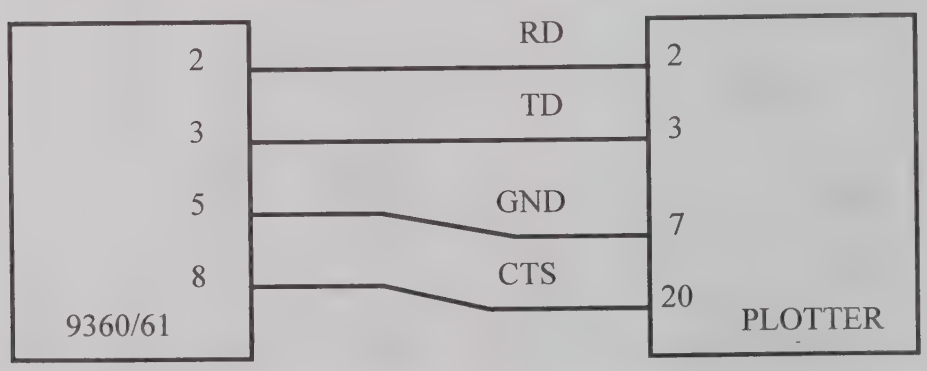
Baud rate	:	9600
Character	:	8 bits
Parity	:	none
Stop bits	:	1

Any exceptions will be mentioned.

RS 232 interface

Pin	1	:	DCD
	2	:	RD
	3	:	TD
	4	:	DTR
	5	:	GND
	6	:	DSR
	7	:	RTS
	8	:	CTS
	9	:	RI

A cable with the following pinout can be used in almost every case:



The cable has D25 connector with male pins on the plotter side, and a D9 connector with female pins on the 9360/61 oscilloscope side.

GPIB Connection

To have a plot done through GPIB initiated with the front panel screen dump push button, you must set the 9360/61 in talk only mode by selecting remote control from RS-232, and the plotter in listen only mode.
If a computer controls the GPIB Bus, both the scope and the plotter must be set in addressed mode (remote control from GPIB).
Remark: the listen only mode does not work on some old HP plotters such as HP7585B or HP7475. The plotter must be set to listener before being able to receive any commands, which is a violation of the GPIB standard.

10.2 Plotters

10.2.1 HP 7470A Plotter

Switch settings:

- RS-232 Connection:
  S1 and S2 : 0 0
  Y/D : D
  A4/US : User selectable
  B4 to B1 : 1 0 1 0

- GPIB listen only:
  A4/US : User selectable
  16 to 1 : 1 1 1 1 1

- GPIB Addressed:
  A4/US : User selectable
  16 to 1 : 0 0 1 1 1

10.2.2 HP 7550A Plotter

Responses to some ESC characters commands are not the same in this plotter as in older HP models like the 7470A. In fact, ESC sequences of commands which give excellent results in the 7470A can prevent any handshake in RS-232.
Problems of this kind have been reported in the case of ESC.R and ESC.@ commands. When combined with ESC.I and ESC.N, ESC.@ breaks up all handshakes.

RS-232 configuration:

- Enter into display 5 (HP-IB MONITOR...).
- Select STANDARD OF STANDARD/ENHANCED.
- Enter into SERIAL sub-menu (display 6)
- For DATA_FLOW, select REMOTE. Either STANDALONE or EAVESDROP may be chosen.
- Enter into display 7 (DUPLEX, PARITY, BAUD).
- Select FULL duplex.
- Configuration PARITY and BAUD rate to the same values as on the DSO.

A standard cable may be used.
Do not start a plot while a sheet of paper is being loaded!

GPIB configuration:

If the scope is in TALK ONLY, the plotter must be in LISTEN ONLY.
Selection will be done at display 5.

Note : Its seems that the plotter must be powered off, then on again, to take any configuration change into account.

10.2.3 Hitachi 672 Graph Plotter (or NSA 672)

As this plotter is compatible with the 7470A, select this mode on the plotter menu page.
Switch settings

- RS-232 Connection:

Sw. A, 1 and 2	:	1 1 (ISO A3) or (ISO A4).
Sw. A, 3 to 8	:	1 0 1 1 0 1
Sw. B	:	1 1 1 1

Note : When switches are set to ISO A4, the pen must be manually repositioned at the top of the page (or plotter reset by powering it off and on) before loading a new sheet of paper.

10.3 Printers

Interfacing is possible through RS-232, GPIB directly, and in option through Centronics. The parallel interface F9300-6 (Centronics) is an option, see section 4.5.

10.3.1 Centronics Printers

Most printers use a Centronics parallel connection which makes direct connection possible if the 9360/61 is equipped with the optional Centronics interface F9300-6 board. If the printer has a Centronics connector then it's a parallel printer, and the F9300-6 board is required or a serial to parallel converter.

If a serial to parallel converter is used, in the printer setup menu select device type Epson, and remote control from RS-232.

RS-232 Remote control port settings:

Baud rate	: 9600 or 19200
Characters length (bits)	: 8
Parity	: none
Number of stop bits	: 1

The following printers and printer switch positions have been tested via serial to parallel adapter.

	Switch 1	Switch 2
1. Epson LQ-1000	1, 2, 3, 4 : ON	2, 6, 7 : ON
2. Diconix 150P	1: ON	2, 6, 7 : ON
3. HP-ThinkJet 2225C	2, 4, 5 : ON	
4. HP-DeskJet 550 C	all down	6 up for 19200 bauds

Note: all Epson and Epson Compatible printers are likely to work if the switches are set properly, (Some experimentation may be required).

Some available serial to parallel converters need power through the RS-232 lines. Do not use them, as we do not guarantee that the serial port is able to furnish enough power.

10.3.2 RS-232 Printers

10.3.2.1 Epson FX80

It is possible to use the standard RS-232 cable. Such a printer has the optional RS-232 interface " #8143 " installed. The configuration that follows is valid for the default scope setting. The standard cable is usable.

In the particular case of an FX850:

- the main switches SW1 SW2 remain at the factory configuration

SW1	:	1	2	3	4	5	6	7	8
		OFF	OFF	ON	OFF	OFF	ON	ON	ON

SW2	:	1	2	3	4
		ON	OFF	OFF	OFF

- the 8143 switches are set to:

1	2	3	4	5	6	7	8
ON	OFF	OFF	OFF	n/a	OFF	OFF	ON

- the 8143 jumpers remain at the factory settings:

J1	J2	J3	J4	J5	JC	JNOR	JRVE	JF	JX
OFF	OFF	OFF	OFF	ON	OFF	ON	OFF	ON	OFF

Note: Epson printers only support XON/XOFF support handshake if they have a print buffer. Such printer are : FX, FX+, JX-80, LQ-800/1000, EX-800 and LQ-25000. Otherwise, use DTR/RTS handshake.

10.3.2.2 Citizen 120D

To use this printer with the default RS-232 setting and default printer setting of the 9360/61, select the following switch configuration:
DIP switch bank 1 : all OFF except 3 and 8, DIP switch bank 2 : all OFF.

10.3.2.3 HP LaserJet

Make sure that page feed is ON in the plotter menu to use the LaserJet. It is advisable to start out in single density with a size of A5. Then, depending upon the internal buffer size on the LaserJet, the image size and/or density can be increased. At one point, the internal buffer size of the DSO is also reached. The image is simply truncated, indicating that either density or size have to be reduced.

10.3.2.4 HP QuietJet

10.3.2.5 HP ThinkJet

To use printer with the default RS-232 setting and with the default cable select the following switch configuration:

- mode switch:

```
1 2 3 4                    5 6 7 8
0 0 0 0 : 11" page length  0 0 0 0
      1 : 12" page length
```

- RS-232 switch:

1	2 3	4 5
1	0 0	0 0
(use DTR handshake)	(8bits, parity none)	(9600 bauds)

Note : it may be possible that old ThinkJet recognize only the Epson protocol. If it is the case use the Epson.

10.3.2.6 HP DeskJet 550C

The standard cable is usable. The printer has been tested at 19200 bauds with the following configuration :

Switch 1 or Bank A : all down

Switch 2 or Bank B : 6 up for 19200 bauds, all the other down

10.3.2.7 Brother Printers

The Brother M-1509 and M-1709 have been tested with a serial connection. On the oscilloscope select "Epson FX-80 or compatible printer".

The switch settings are identical for both the printers:

- SW1 :	1	2	3	4	5	6	7	8
	ON	ON	ON	OFF	ON	n/a	n/a	ON

- SW1 :	1	2	3	4	5	6	7	8
	←		ALL OFF			→		

- SW1 :	1	2	3	4	5		6	7	8
	OFF	OFF	OFF	OFF	11" : OFF 12" : ON		OFF	ON	OFF

10.3.3 GPIB Printers

10.3.3.1 HP QuietJet

Make sure the dip switches on the backplane of the printer are set to

- SRQ enable: 0

- GPIB listen only:
  Listen always: 1
  A5 to A1: 0 0 1 1 1

- GPIB Addressed:
  Listen always: 0
  A5 to A1: 0 0 1 1 1

10.3.3.2 HP ThinkJet (HP 2225A)

Make sure the dip switches on the backplane of the printer are set to

- SRQ Enable: 0

- GPIB listen only:
  Listen always 1
  A5 to A1: 0 0 1 1 1

- GPIB Addressed:
  Listen always: 0
  A5 to A1: 0 0 1 1 1

10.3.3.3 HP PaintJet (black/white only)

Make sure the dip switches near the GPIB connector are set to:

- GPIB Listen only:
  NORM/SCS: NORM
  A3 to A1: 1 1 1
  PC8/ROM8: N/A
  ENG/MET: has to match paper size ENG = 11" MET = 12"

- GPIB addressed:
  NORM/SCS: NORM
  A3 to A1: any combination except 1 1 1
  (correspond to add. 0-6)
  PC8/ROM8: N/A
  ENG/MET: has to match paper size ENG = 11" MET = 12"

10.4 Information on GPIB

10.4.1 Introduction

This section is a simple description of the GPIB interface as an aid to understanding the interface in the 9360/61 DSO: it is not intended as a complete specification of the system.

The GPIB system is designed for the interaction of a number of devices, which may transmit or receive information as required. The system includes data lines over which the actual data are sent, bus management lines for control, and handshake lines to ensure correct acceptance of data at the right destination. The main features of the bus are summarized below:

Maximum number of devices	15
Maximum bus length	20 meters or 2 meters per device, whichever is less.
Connection	star or chain

Note that more than half of any connected devices must be powered up, even if they will not be used.

Data lines	8 DIO	1 to 8
Handshake lines	DAV	Data available
	NRFD	Not ready for data
	NDAC	not data accepted
Bus management lines	EOI	End or identity
	IFC	Interface clear
	SRQ	Service request
	ATN	Attention
	REN	Remote enable
Active level	+0.4 V	
Inactive level	+3,3 V	

Note that all signal lines are active low, and that they are wire 0Red to allow participation by all devices.
In addition, there are 8 ground lines, making a total of 24 lines.

10.4.2 Functions in the GPIB

In order to allow satisfactory interconnection of several devices the following functions must be provided

- Enabling any device to transmit data
- Preventing any device from transmitting data
- Enabling any device to receive data

- Preventing any device to receive data
- Transmitting data to a specific device
- Ensuring that only one device is transmitting
- Ensuring that transmitting takes place only when reception is possible
- Enabling any device to request servicing
- Identify type of data to be sent

Any device can be activated into the "talk" or "listen" state, and can be deactivated by the commands "untalk" and "unlisten". Also a device can be a "controller".

Maximum number of current talkers	1
Maximum number of current listeners	14
Maximum number of current controllers	1

Function of bus lines:

- DAV — Data available; talker says the data on the line are valid.

- NRFD — Not ready for data; listener says it is not ready for more data. All listeners must release the NRFD line, i.e., let it go high, before talker can send.

- NDAC — Not data accepted; listener says it has not yet accepted the data. Talker must hold all data lines steady until all listeners have released this line, i.e., it goes high.

Clearly, the NRFD and NDAC are easy to implement by a wired OR system, so that any one device asserting the signal prevents progress to the next step. Progress is made at the speed of the slowest listener. A simple timing diagram is given in figure 10.1, and another way of presenting the system is given in figure 10.2.

The bus management lines functions as follows:

- EOI — End Or Identify; talker sends this with last byte of a block transfer to indicate last byte. Also used with ATN to parallel poll devices for their status bit.

- IFC — InterFace Clear; places the GPIB system into a quiescent state.

- SRQ — Service ReQuest; any device can send it to the controller to indicate need for attention, and to request interruption of current operations.

- ATN — ATeNtion; controller sends this to specify whether DIO lines are to be used for interface messages, e.g., addressing, or for data.

- REN — Remote ENable; selects a device as being under local or remote control.

Addressing of the devices on the GPIB bus consult a specialized GPIB-IEEE488 document.

The principles of GPIB are quite simple - the system must wait for all users, and lines are wire ORed so that all can pull the lines down. The handshake sequence is illustrated in two ways. In figure 10.1 the signal waveforms are sketched.

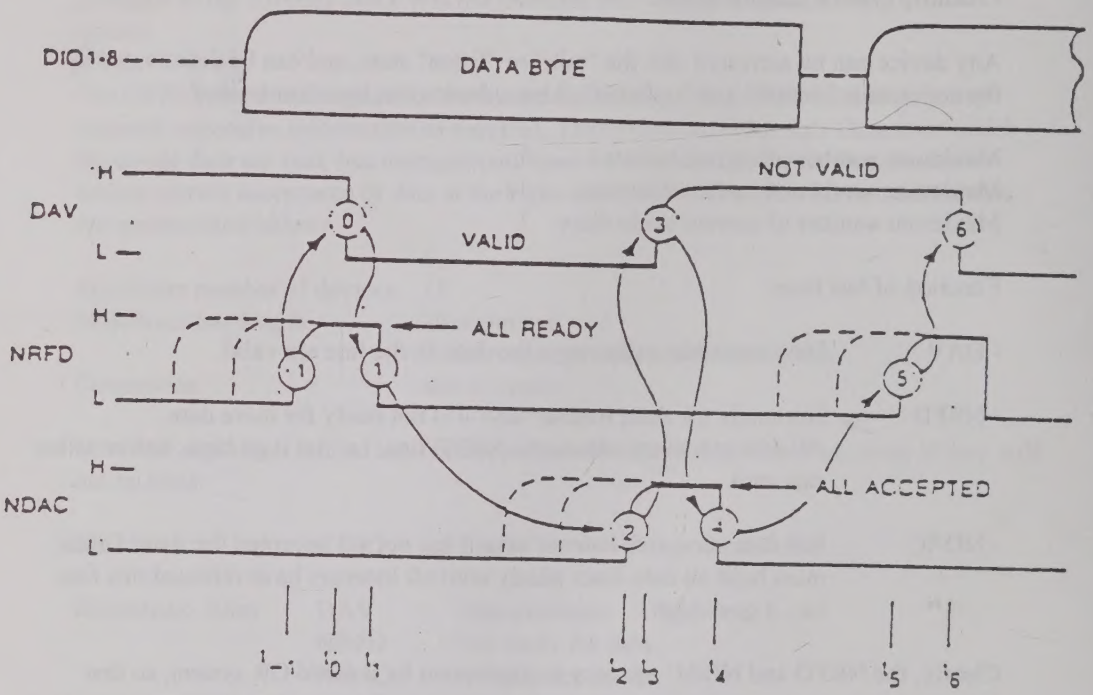


Figure 10.1 : DATA BYTE TRANSFER IN GPIB IEEE-488

The handshake timing sequence proceeds as follows:

Preliminary	The source checks for presence of listeners and places the next data byte on the data lines DI01-8.
t-1	Acceptors one by one become ready for byte. Last one allows NRFD to go high.
t0	Sources pulls down DAV to validate data.
t1	The first litener to accept the data pulls down NRFD to show it is no longer ready for a new byte.
t2	The listeners one by one accept the data, and the last one lets NDAC go high.
t3	The source sets DAV high to show this byte is no longer valid.
t4	The listeners one by one accept this, the first one pulling NDAC low for the next cycle.
t5	As for t-1.

LeCroy